agriculture

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Advice and information about electric farming methods is freely available and full-time specialist staff are in attendance. Intensive training courses and conference facilities are also available for use by recognised agricultural organisations. The new Centre is designed to meet the needs of all sections of the agricultural industry and to assist farmers in their efforts to increase productivity and cut costs.

For further information regarding the facilities offered by The Electro-Agricultural Centre contact your local Electricity Board; The Electricity Council, EDA Division, Trafalgar Buildings, 1 Charing Cross, London SW1; or the Deputy Secretary (N.A.C.), Royal Agricultural Society of England, National Agricultural Centre, Kenilworth, Warwickshire.

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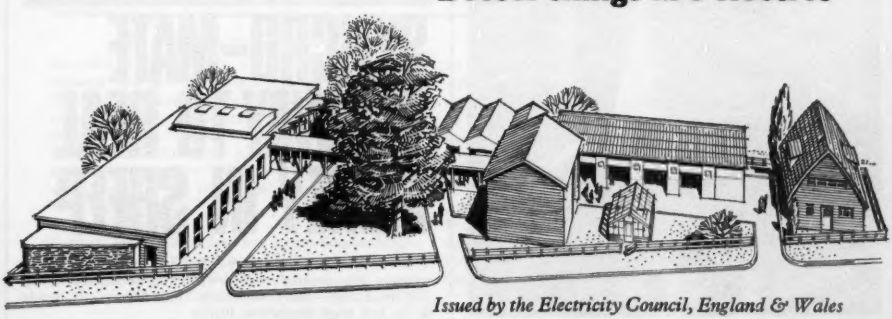

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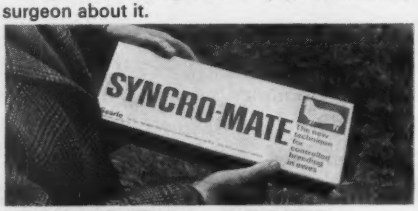

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Agriculture

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The National Agricultural Centre

Kenilworth, Warwickshire

FOR very many years the Council of the R.A.S.E. considered creating a permanent site for the Royal Show and other of its activities. In fact, the Society was the first to purchase a permanent showground—at Park Royal in London—but the shows held there between 1903 and 1905 were not a success. This failure, quite naturally, caused the Council to be extremely cautious in mounting another such venture and it was not until the late 1950s that the question was again given serious consideration. A fact-finding committee was set up in 1960 to investigate the future activities of the Society and its report, presented the following year, clearly showed that the permanent site of the Royal must evolve into the 'agricultural centre of England'.

Such a permanent site—at Stoneleigh Abbey, Kenilworth, Warwickshire—was acquired on a 99-years' lease and the first Royal was held there in 1963. Steps were immediately taken to establish an all-the-year-round centre for agriculture with the result that by 1967 a National Agricultural Centre had emerged. In December, 1965, at the instigation of Lord Netherthorpe, then President of the R.A.S.E., a national conference was held in London and representatives of fifty-eight agricultural organizations throughout Britain attended. The concept of a National Agricultural Centre (N.A.C.) was unanimously endorsed and an Advisory Board (N.A.C.A.B.) was formed.

The N.A.C. will be formally opened on 29th September, 1967, by Mr. G. T. Williams, President of the National Farmers' Union, and thereafter public 'open days', with the co-operation of the Ministry, will be regularly staged, the first being on Thursday, 19th October, 1967.

The N.A.C. at the moment consists of demonstration units concerning pigs, poultry, calf rearing and a 'Beef from Grass' demonstration. A Farm Buildings Centre was set up in January, 1964, while a comprehensive Electro-Agricultural Centre (E.A.C.) made its début at the Royal Show last July. The Farm Management Association has established Headquarters there and the Beef Recording Association has set up a bull performance test centre, initially for the 'red' beef breeds. The M.M.B. have a permanent bull holding unit at the Centre. There is also a National Beekeeping Centre.

The National Grassland Demonstration is now staged at the Centre, the next being in May, 1969. Conferences, livestock auction sales and kindred

An aerial view of the National Agriculture Centre at Stoneleigh Abbey, Kenilworth, Warwickshire

events are also held. The British Horse Society and the British Show Jumping Association have created a National Equestrian Centre and are building a large covered riding school. Centres for sheep, dairy cattle, agricultural machinery, horticulture and forestry are under discussion. It is emphasized that the N.A.C. is a demonstration centre for modern farming techniques which have been shown to be effective; experimental work will not be carried out.

In the words of Lord Netherthorpe there is in Britain for the first time '. . . a Centre capable of promoting major practical advances for British Agriculture and of becoming a British forum of influence and importance in world agriculture . . .'

Derek Stannard

Horticulture Improvement Scheme 1966

Encouraging response in first year of New Scheme

The Horticulture Improvement Scheme was first introduced in 1960 under the Horticulture Act of that year. It provides for grants of a third of the cost of capital improvements to horticultural production businesses and horticultural marketing co-operatives. Its scope was widened in 1964. The most recent revision, which took effect on 21st July, 1966, liberalized the qualifications for grant and extended the list of eligible improvements, in particular by bringing in new (in addition to replacement) glasshouses.

The H.I.S. is the principal of several horticultural grant schemes for which the Agriculture and Horticulture Act 1964 makes available a total of £24 million (or £27 million if increased by Order). So far approximately £10 million has been paid or committed in Britain. Applications must be submitted by April, 1974.

The Agriculture Act 1967 adds a 5 per cent investment supplement to grants to horticultural production businesses.

The Influence of Herbicides on Horticultural Production

R. F. Clements

THE introduction of effective herbicides is probably the most significant development of the last ten years in production techniques for horticultural crops. In this short space of time herbicides have become established as essential tools in economic crop production and are accepted as such by most progressive growers. The range of materials has steadily increased over the years. New and improved products have been introduced, but rarely have they entirely superseded earlier herbicides, so that at the present time there are about forty different materials available that can be used in a bewildering number of combinations. As herbicides of increased selectivity have been developed and brought into commercial use so the need for further improved products has increased; whereas a few years ago growers were satisfied with a herbicide that controlled some weeds, the standard of control demanded now is much higher and soon nothing less than 100 per cent will be expected.

The ideal of eliminating the need for cultivations as a method of weed control is not an end in itself, even though chemical methods may be cheaper and more effective. But freedom from cultivations means freedom from the restrictions of row width and plant spacing that have hitherto been imposed by the need to cultivate mechanically. This opens up a new concept of management that we have yet hardly begun to exploit.

Vegetable crops

Vegetable crops present the most difficult problems in attempting to control weeds by herbicides alone. In 1957 seven herbicides were recommended. By 1963 the number had risen to twenty. This year thirty-four herbicides that may be used straight or as mixtures are available. This dramatic increase not only emphasizes the need for efficient methods of weed control but also the inadequacies of many of the existing materials. Many vegetable crops and weeds are botanically related, so that if a herbicide is safe on a wide range of crops it is likely to be ineffective against many weeds. Herbicides that owe their selectivity to a high degree of inherent tolerance on the part of the plant are so far few. The safety of a treatment, therefore, depends on applying it at precise doses and crop stages, so as to minimize the risk of damage to the crop while controlling the weeds growing amongst it. Two or more herbicides may be necessary to give adequate weed control throughout the season.

Before the introduction of herbicides weed control in black currants was a difficult problem

Plant spacing

Research on plant spacing in relation to yield and maturity goes on independently of the search for effective herbicides, but when results of both are combined in a growing technique the results may be remarkable. The most well-known example of this fusion of research is the bed system of carrot production. Carrots, parsnips, celery and parsley all show considerable tolerance to linuron, prometryne and solan, which are now recognized treatments for weed control in these crops. Provided that the correct material is chosen and used in the right way mechanical cultivations are unnecessary, so that row spacing and plant arrangement can be planned according to the requirements of the crop.

It is estimated that between 5 and 10 per cent of the carrot acreage is now grown on the seven-row bed system, and under favourable conditions yields of 40 tons per acre of ware carrots are possible. But the further exploitation of this technique depends on yet another aspect of research, for a completely satisfactory harvester capable of handling the vast bulk of crop and soil has not yet been developed.

Plant spacing is not only affecting the yield potential of many crops but in conjunction with precise sowing dates has an influence on size and maturity of individual plants. Thus carrots may be grown to meet the specification of the canner or the requirements of the fresh market. Baby beet for pickling is another crop in which higher yields of uniform roots produced according to a definite time schedule may be possible. There is interest, too, in potatoes for canning, and research results suggest that to produce economic yields it may be necessary to plant small seed potatoes at spacings that preclude the possibility of inter-row cultivations.

Much progress has been made during the last three years in techniques for 'single-pick' harvesting of Brussels sprouts. The economic success of this method of growing depends on obtaining the highest possible number of marketable sprouts at a given harvest date, and to ensure continuity of supply successional harvesting is necessary. Since date of maturity and size of sprout are influenced to some extent by spacing, the optimum plant density may prove to be one that does not permit any mechanical cultivations.

The successful exploitation of these new developments depends on the availability of herbicides that will both control weeds throughout the life

of the crop and cause no significant check to the plants. This objective has been achieved for the umbelliferous crops, is some way to being achieved for most of the brassicas but is not yet in sight for beetroot, onions, runner and dwarf beans.

Fruit crops

Progress in chemical weed control in fruit during the last ten years has been spectacular. The extensive use of herbicides at the present time is mainly due to the introduction of simazine, the effectiveness and safety of which has encouraged the acceptance of other materials.

Simazine became commercially available in 1959 and black currants were one of the first crops in which it was extensively used. A survey conducted by Rendell and Shore of the University of Bristol in which 44 black currant plantations have been costed annually since 1947 strikingly demonstrates the way in which simazine and other herbicides have been accepted by growers. In 1947 no herbicides were being used in any of the costed plantations, but by 1964 about 93 per cent were treated with nine different herbicides. The rapid increase dates from the introduction of dalapon in 1958, and from simazine in the year following with the percentage of total expenditure on these two materials almost exactly reversing over the period 1957–1964. In 1959, 67·6 per cent of the total expenditure on herbicides went on dalapon and 18 per cent on simazine, but in 1964 the expenditure on dalapon was down to 10 per cent of the total, while that for simazine accounted for 67·6 per cent. Paraquat and diquat which were introduced in 1962 accounted for a further 11 per cent.

Although no figures are available for other bush and cane fruit crops it is likely that herbicide usage follows a similar trend for the weed problem is common to all crops. Programmes are now based on a mixture of paraquat and diquat to kill existing annual weeds and simazine to give residual control. Perennial grasses and broad-leaved weeds still remain a problem despite the use of dalapon and spot treatment with growth regulator herbicides, but during the last three years dichlobenil and chlorthiamid, two herbicides that will control some perennial weeds have been introduced and are likely to prove extremely useful. The proper use of the existing herbicides is capable

The use of herbicides has made complete weed contro. possible without the need for cultivation

of controlling the majority of weeds in bush and cane fruit crops, and so eliminating the need for cultivations. Experimental evidence suggests that there is no adverse effect on soil structure when a soil remains uncultivated and in some crops, absence of soil and root disturbance may have a beneficial effect on growth and cropping.

A considerable acreage of black currants is already managed on non-cultivation lines which are proving highly successful on different soil types. Apart from the benefits of improved weed control the elimination of the need to cultivate has allowed greater flexibility in plant arrangement. Higher bush densities can be used and this in turn has made mechanical harvesting of the fruit a practical proposition. Mechanical harvesting of black currants is in its infancy but already prototype machines are in commercial use. Although the best plant arrangement and harvesting method has not been finalized it is certain that to give an economic output of fruit much closer bush spacing will be required than where the fruit is picked by hand. Close plantings are only practicable because effective herbicides have made cultivations unnecessary.

Strawberries

Strawberry growing has been revolutionized by the use of herbicides. Weeds have always been a major problem in this crop and in the past it was not uncommon for 25 per cent of the total production costs to be spent on cultivations. Herbicides have not necessarily reduced the cost of weed control but they have made it possible even in the most difficult seasons. Estimates of the acreage of strawberries treated with herbicides indicate that approximately two-thirds of the national total are sprayed with either simazine or chloroxuron. These two materials in conjunction with a contact herbicide are capable of completely controlling annual weeds from time of planting onwards, and a large acreage of strawberries is now grown entirely by non-cultivation methods.

The main effect of herbicides on the strawberry growing industry is to make weed control independent of the availability of labour. This has increased the scale of production, for larger units can be managed with less labour, but it has concentrated the labour requirement into a peak at picking time. Seasonal labour for picking is nevertheless easier to find and cheaper than a regular labour force supplemented by seasonal workers. Mechanical harvesting of strawberries depends on the production of even-ripening varieties that bear their fruits well clear of the leaves. When these are available completely weed-free conditions will be an essential part of the growing technique.

Top fruit

In top fruit crops herbicides have proved of particular value for controlling weed growth around the tree bases. Trees can be planted directly into strips or squares in a grass sward that have been killed by the use of paraquat or into clean cultivated soil that, save for the area round the tree bases, is later grassed down. The cost of these treatments may be as little as 50*s*. per acre for a complete herbicide programme.

Many apple orchards are now managed on an alternate strip principle in which wide herbicide treated strips in the tree rows alternate with grass in in the inter-rows. Where trees are widely spaced only a small area at the tree base may be treated but with hedgerow planting the alternate strip

method is the only practicable one. Grass swards have so many advantages that it is unlikely that non-cultivation will be acceptable as a method of managing apple plantations, but at least one pear grower is experimenting with the technique. Complete non-cultivation is the obvious alternative to the traditional methods of cultivating plum plantations but herbicides that can safely be used in this crop are at present few.

Bulbs and nursery stock

Although herbicides have made weed control in bulb crops cheaper, easier and more effective than when cultivations were the rule, they have of themselves had little influence on production techniques. Decisions involving spacing or whether to grow in ridges or beds depend on other factors. But complete weed control throughout the life of the crop is becoming more important as mechanical harvesting methods develop. In tulips, clods formed through soil compaction are a major problem during lifting and any technique that reduces traffic during the growing season will help to avoid them. Residual herbicides that will control a wide range of weeds as well as lasting 7–8 months in the soil are needed. The existing materials although used on most of the bulb acreage, are inadequate in both these respects. Weed control usually breaks down by the time the spring flush of weeds germinates and in many areas repeated use of a limited number of materials has resulted in an increase in resistant weeds.

The production of hardwood nursery stock has been the last important section of the horticultural industry to benefit from the use of herbicides, but already significant changes have occurred. Rose growing has become a large-scale, almost fully mechanized, operation. Residual herbicides applied after planting the seedling stocks, after budding and after heading back the following year have made other methods of weed control unnecessary. This in turn has led to the technique of earthing up the stocks after planting and removing the soil by 'blowing' prior to budding, thus both improving the condition of the stocks and eliminating the need for hoeing out.

New ideas wanted

Because of the number of species involved in the production of nursery stock no one herbicide is likely to prove safe for them all, but because weed control is such a major cost item growers are looking for ways in which chemicals may be more fully employed. There is a great deal of scope for the directed application of contact herbicides, using shielded sprayers to prevent drift, while some growers are grouping plants according to their tolerance to certain various materials such as simazine, chlorpropham and lenacil.

Although herbicides have had a considerable impact on all sections of the industry their full potential is clearly still to be realized. Many useful materials are already available and others are under development, but to exploit their possibilities to the full it will be necessary to adopt entirely new ideas in many other aspects of crop management.

R. F. Clements, N.D.H. (Hons.), who is the N.A.A.S. Horticultural Liaison officer with the A.R.C.'s Weed Research Organisation at Oxford, spent several years as a Technical Assistant with the Land Settlement Association and as an adviser to a fertilizer company before joining the N.A.A.S. in 1958. He was horticultural adviser in Somerset for six years before taking up his present post.

Intensive Cereal Growing

Break Crops — Field Beans

R. G. Hughes **M. H. R. Soper**

THE desire for a break crop from continuous cereal growing, the stimulation of an acreage payment and the offer of contracts for the produce has once again turned the attention of farmers to the field bean crop. It is already possible to see a larger acreage being grown, particularly in the South and East, than has been apparent for the last twenty years. It might therefore be timely to take another critical look at the crop and to assess whether modern farming developments have removed some of the risks which so often caused disappointments to growers in the past.

Important developments

Compared with the situation twenty years ago, one of the important developments seems to be the greater interest that is now being shown in the spring-sown types, both tick and horse beans, than in the winter varieties, and there appears to be some movement of the crop away from the traditional clay land on to the medium loams and lighter soils. In the past the larger acreage of beans was winter-sown on heavy soil, for it provided a relatively useful break crop on land that was unsuitable for growing roots and on which the clover ley provided the only alternative break. Beans yielded a moderately high protein concentrate feed useful for all classes of stock at a time when imported protein was not so common as it is today and when the home mixing of rations was widespread. In addition, on the heavy land, it provided a crop which could be sown in the autumn, thus avoiding the danger of late spring seedbeds which was a very real one in the days of horse-power. The land could of course be kept clean by horse and hand-hoeing in the spring and the crop was rightly regarded as a good cleaning crop. Furthermore, taking one year with another, the winter-sown crop could be relied upon to outyield the spring-sown by several hundredweight per acre, even if there was the occasional year when winter frost or chocolate-spot disease caused catastrophic losses in yield.

Present situation

Today the situation is quite different. The heavy land farmer has infinitely greater power at his disposal for preparing spring seedbeds as soon as the land is fit and the newer varieties of stiff strawed barley have provided him

Comparing varieties and nitrogen interaction for spring tick beans, (left) Maris Beard with nitrogen 35 units in seedbed (right) Maris Beard with no nitrogen in seedbed

with an additional crop for extending the rotation. Furthermore, the problem of soil fertility and soil-borne disease under a highly intensive cereal rotation does not seem to be so serious as on the lighter soils. Today it is the farmers on the lighter type of soil who are most anxiously looking for a break crop and it is to them that the field bean appears most attractive as a 'possible' in a rather limited choice, particularly as it can be handled with virtually the same machinery as their cereal crops.

The winter bean has never been a very reliable crop on light land whereas the spring bean, rightly or wrongly, has the reputation of doing slightly better on such soils. There has, in recent years, been a profitable market for tick beans for the pigeon trade and more recently this type of bean has proved eminently suitable for the export trade. These two markets absorbed 50,000 tons of beans grown in 1966—equal to two-fifths of the total bean crop in that year. There is a further advantage for the large scale mechanized farmer in that the spring types come to harvest after cereal harvest is over in most years, much later in some years, whereas winter beans tend to clash with both wheat and barley.

The present situation may be summed up by saying that there are still a considerable number of heavy land farmers who will continue to grow winter beans, but most of the present increase in acreage appears to come from the lighter land and to consist of spring-sown types. The need of the farmer on this type of land is for a crop which (1) will avoid the build-up of cereal diseases; (2) can be handled with existing machinery; (3) will provide an opportunity for cleaning the land and (4) will give a gross margin somewhere near that of barley. Does the bean crop meet these requirements? On the first and second point the bean crop fits the bill. It is on the third point where most doubts arise, for in spite of some optimistic statements over the past few years, it is still not really the case that herbicides can be a substitute for hand and tool-bar hoeing. Certainly the introduction of simazine has helped but it is not the whole answer to the problem of weeds. In regard to the economic return, gross margins can often be comparable to those of barley though not perhaps, on average, quite so high.

The cultural requirements

Little new experimental work has been done in recent years on the cultivation needs of the crop and the general principles laid down in the past still hold good to-day; these may be summarized as follows:

1. Early sowing into a suitable seedbed is important, but there is some danger from winter proudness with too early sowing in the autumn. For winter crops the first fortnight in October can be taken as the best time. November sowing, in some years, can be hazardous, for establishment may be very slow and bird damage correspondingly high leading to a weak, gappy plant. Late sowings in the spring increase the risks of drought and late maturity under adverse harvest conditions. Sowing during the first fortnight in March is desirable for spring beans provided seedbeds are suitable.
2. Although fertilizer trials in the past have frequently given very inconclusive results, it is advisable to ensure a reasonably high level of both phosphate and potash in the soil. An application of 40 units per acre of P_2O_5 and K_2O should meet the requirements of most bean crops grown in an intensive cereal rotation. Higher levels of potash may be beneficial on some light land or as a precautionary treatment to reduce the incidence of chocolate-spot in winter beans. It is true also that a moderate dressing of farmyard manure can be a valuable preparation for the crop. Some growers of spring beans have shown benefit from an application of 30–40 units nitrogen in the seedbed in recent years. One very important factor is to avoid growing the crop on acid land.
3. Seed rate is undoubtedly of some importance particularly with spring beans which have little capacity for branching compared to the winter varieties. For the larger seed of the winter type and the spring horse bean a minimum seed rate of 220 lb per acre is desirable, whereas a range of 180–240 lb per acre should be used for spring tick beans depending on the variety sown, seedbed conditions and means of sowing. Corn drills are generally not ideally suitable for sowing beans and there is need for careful calibration of such drills under working conditions. Even more important is the need to sow beans at least two inches deep, preferably three, to reduce bird damage and to minimize herbicide toxicity particularly where the higher recommended rates of simazine are used for weed control.
4. Row width, up to 21 inches, is not itself important provided the land can be kept reasonably clean. Where weed infestation is likely to be high and not readily controlled by simazine, wide rows, to allow for inter-row cultivation, are necessary. Where the land is fairly clean, narrow-row drilling, as used for cereals, probably pays off.

These are the main points of cultural importance, but what of the hazards? Have recent developments removed some of the previous risks of growing the crop? The three principal risks have always been frost and chocolate-spot in winter beans with aphid damage a serious menace in the spring-sown crop. In addition bird attacks on germinating seed can be devastating, weed competition severe and the climatic effect quite unpredictable.

Frost

Plant breeders are now engaged in attempts to produce higher yielding varieties of both winter and spring beans but it does not seem that there is

yet a truly frost hardy type of winter bean. Spring beans, on the lighter loams, can also be damaged where land is likely to puff-up following frost. The bean plant dislikes any form of root disturbance.

Chocolate-spot

In certain years, with mild humid conditions in late spring, very great damage can be done by this disease which spreads at an alarming rate through winter-sown crops to cause serious yield loss. This is far less common an occurrence in spring beans at least before the pods are fully formed. Late attacks in the spring crop have been known to ease harvest by desiccation of the foliage. An increase in bean acreage is already showing an increase in the spread and intensity of chocolate-spot, particularly in southern counties, and this is undoubtedly aggravated by failures in cropping hygiene where shed beans and trash, carrying the disease, are allowed to remain to affect neighbouring winter-sown beans well into the winter months. There is, as yet, no reliable fungicide treatment capable of exerting an effective control and no in-bred varietal resistance in the bean varieties currently available.

Aphid

The main hazard with spring beans is aphid attack leading to serious yield loss. Fortunately effective systemic aphicides in granular or spray form are now available, and in districts where the damage is an annual occurrence it is a worthwhile insurance to treat the crop on a routine basis just prior to flowering. Application at this growth stage seldom causes any significant wheel damage particularly if high clearance tractors are used. It is a fairly costly operation so the possible gains have to be weighed against cost. In some areas headland barrier spraying may be effective at the early infestation stage but the intensification of bean cropping in southern counties is already rendering this approach of doubtful value. Bees and other pollinating insects are of considerable value in obtaining a good even set of pods in the bean crop and the application of aphicides should aim at the minimum disturbance of this insect function. Granular aphicides are not

Simazine for weed control. Unsprayed strip showing growth of annual grass weeds at harvest

Harvesting spring tick beans in mid-September —variety trial

harmful to bees, but growers contemplating the use of aphicide sprays should warn local beekeepers of their intentions (or if a Bee Warning Scheme operates in the county they should notify their M.A.F.F. Divisional Office) so as to allow for temporary closure or removal of hives during and shortly after application.

Bird damage

Damage from rooks and pheasants at crop emergence stage can cause serious loss of plants and this factor must be considered in the siting of fields for the crop. Repellents in the form of seed dressings may prove effective but a close watch with the use of bird scarers or guns is necessary during the first few weeks after sowing to reduce losses.

Weed control

In spite of tool-bar hoeing beans have always been rather a fouling crop since hand-hoeing became uneconomic. The herbicides of the simazine type have undoubtedly helped greatly in controlling many of the annual weeds which formerly infested the crop, though in some years these herbicides seem to be markedly more effective than in others owing to seedbed and climatic conditions. Simazine will *not*, however, provide an effective control of perennial weeds particularly true couch grass nor is it very effective against wild oats or cleavers. These are often troublesome weeds where beans may otherwise be a useful break crop from a succession of cereals. Couch grass is, of course, the greatest carrier of take-all disease on the farm and a couchy crop of beans is not a break crop offering a means of reducing soil-borne disease incidence. In fact in the presence of couch grass the bean crop offers little scope for cleaning land. The leaves senesce and drop some time ahead of harvest in most years allowing the weed grass to grow and build up reserves to defy any late autumn attempt at eradication. It cannot, therefore, be argued that beans are in all cases a good break crop from land cleaning point of view—they may well be the reverse and no farmer should conclude that simazine has entirely solved the problem.

Seasonal effect

Finally there is the seasonal effect to be considered. There are good years and bad years for bean yields, apart from the factors already considered,

though this is perhaps less true of spring beans than winter beans. The main influence is of course basically climatic though physiologically the causes are still largely unknown. A warm spring with a moderate rainfall to get the crop established, followed by a sunny late June and July, can be relied upon to provide high yields though excessive heat or drought can reduce them. A wet summer, especially in June or July, stimulates the crop to excessive vegetative growth and to defective pod setting with a resultant low yield. The bean plant is a profligate producer of flowers but in some years pod development is poor. Whether it is a case of plant growth, hormone balance, effective pollination, failure in nutrient supply, light intensity or environmental temperature at a critical growth stage is still unknown. Whatever combination of factors are responsible there is this big difference between years and anyone who grows the crop must be prepared for variable yields. As has already been stated the risks of extreme variation in yield do appear to be less in the spring-sown crop and many growers of spring beans have claimed to achieve a fair consistency of profitable yield in recent years.

Research will in due course, no doubt, provide the key to the present liability to fluctuations in yield and provide means of stabilizing the profitability of beans. At present any grower contemplating the crop as a profitable break from cereals must abide by *all* the rules of growing it and even then not be disappointed if in some years grain yields are not so good as in others. At its best the bean crop will compare very favourably with and may exceed the returns from barley but in a bad year it can fall some way below it in spite of all reasonable precautions having been taken. A farmer should not conclude on the result of one or even two years' experience that the crop is of no use to him. New varieties and improved techniques, which are bound to materialize in the years ahead, may well make field beans a highly profitable alternative to cereals particularly in the event of a world shortage of protein.

R. G. Hughes, B.Sc. (Hons.), University College of Wales, is Regional Crop Husbandry Adviser for the N.A.A.S. in the South-Eastern Region. His co-author, **M. H. R. Soper, O.B.E., M.A.,** is a senior lecturer in the Department of Agriculture, University of Oxford.

Grant for Field Beans Harvested in 1968

Details are now available of the new grant scheme for field beans announced at this year's Annual Review. An explanatory leaflet can be obtained from the divisional offices of the Ministry of Agriculture, Fisheries and Food in England and Wales, the Department of Agriculture and Fisheries for Scotland, Broomhouse Drive, Edinburgh 11 and the Ministry of Agriculture for Northern Ireland, Magnet House, York Street, Belfast 15.

Subject to whatever may be enacted by Parliament the scheme comes into operation on 1st July, 1968, and the rate of grant will be £5 per acre for field beans harvested as grain or available for harvesting as grain on such a date as the Minister may determine.

Growers wishing to claim grant should apply during November, 1967, for form FB1 on which they can declare the acreages they have sown. After the harvest, form FB2 will be sent to growers who have submitted valid claims on forms FB1 so that they can declare the acreage harvested. Payment will be made as soon as possible after receipt by the Department of valid forms FB2.

Grant will not be paid on crops of kidney, French, runner or broad beans nor on mixed crops or crops picked or harvested green. No grant is payable on a crop of field beans which fails before 1st September in the year of harvest. Eligibility for grant of subsequent failures will be determined by the Department after inspection of the failed crops by an authorized officer.

The Autumn Feeding of Cows

S. M. Boden

AUTUMN is a time of moist mornings and early evenings, but grass still struggles to make a brave show. Is it all surface show—with little inner value? Opinions may differ about this (fairly enough, for different localities have different experiences) but only about the *rate* of decline in the value of the grazing and not about the *inevitability* of the event.

Supplementing grass

Grass which has been well managed throughout the season, each regrowth invigorated with appropriate fertilizer and cleansed from fouling by alternate use for conservation, will continue to produce milk in quantity months after neglected pastures have become mere exercise grounds. Uniform leafiness in late autumn may, however, be deceptively good-looking. There should be no lack of protein in such herbage if applications of nitrogen have been faithfully maintained, but it may be less efficient as a provider of energy-supplying nutrients than spring grass of similar appearance. Where spring grazing was able to produce a certain amount of milk without supplementation of any kind, the same yield will now be obtained only by feeding concentrates one or two gallons sooner; but the supplement need only be cereal. Balanced concentrates are not required as there is still an excess of protein in the herbage.

If it is judged that the grass by itself is capable of maintenance plus the first gallon, then the second could be found from 3½ or 4 lb of barley and perhaps the third similarly; thereafter balanced concentrates would be used for higher yields. To feed cereals as well as balanced concentrates offers few problems when mangers are used in cowsheds, but certain milking parlours do not lend themselves to two varieties of concentrates, and a solution is found by replacing equal amounts of cereal and fully-balanced concentrates with their combined weight of a low protein concentrate of the grazing nut type.

The introduction of supplementary cereal, which becomes necessary sometime in September in most places and seasons even with the best of management, affords an opportunity for incorporating a preventive of staggers. The autumn flush of grass can be as difficult as that of the spring, and where trouble has been encountered previously it is a wise precaution to include 2 oz of the granulated form of calcined magnesite in the crushed cereal or to use specially prepared nuts with this amount included.

It is imperative that all changes in feeding should be made slowly so that the ruminal flora can be adjusted to the new conditions. If this is not done there will be upsets both in the quantity and quality of the milk. Preparation for the change from grass feeding to other bulky foods must begin while there is still plenty of grass. According to the circumstances of the farm the winter feed will be kale, silage, hay, straw, roots or any combination of these.

Kale

If kale is available for autumn use it should be introduced slowly while grass is still the main feed. The farmer is fortunate whose land is dry enough to allow kale to be strip-grazed and, where possible, this is the way to offer it. Otherwise, it can be cut and spread on pasture or forage-harvested for yards. Opinions differ on the amount which can be fed safely. On some farms one hundredweight per head daily has caused no trouble whatever, on others even 70 lb has been too much. Why should this be? No one really knows. There are so many variables—variety, soil type, fertilizer treatment, climatic conditions—that it is not possible to lay a finger on any one cause. Trouble may occur on a farm in one year and not in another. Suffice it to say that heavy kale feeding can be accompanied by disturbances such as infertility, anaemia, and blood in the urine. A reddish-brown, discoloured urine is a dramatic symptom which calls for an immediate cessation of kale usage and only a cautious resumption at a lower level of feeding when the trouble has cleared. The effect on fertility can be prevented by using a mineral mixture as high in phosphorus as possible and containing also an extra supply of important trace elements such as iodine and copper.

In spite of these possible disadvantages, kale is too valuable as a very cheap source of nutrients, in large yield per acre, to be given up lightly. Experience will teach what quantity may be used, but no trouble should be anticipated at a level of 50 or 60 lb. Half a hundredweight of leafy, late-sown kale with 7 or 8 lb of hay and the same amount of barley (fortified with the special minerals) could maintain an average-sized cow and provide for 2 gallons of milk as well.

Silage

If kale is to be followed by silage, it is a good plan to arrange that silage feeding should begin when the time arrives for the herd to be housed at night, but while it is still going out to kale (and whatever grass may still be available) during the day. This overlapping of the bulk feeds is in line with the principle that sudden clean-cut changes should be avoided.

Careful thought must be given to how much of a bulk feed can be allowed as a daily ration having regard to the numbers of stock, the days of use and the estimated tonnage of the feed. Weight of kale per acre may be estimated by cutting and weighing small measured areas of representative growth, and the weight of silage in a clamp may be assessed by calculating the capacity from the dimensions and assuming that 1 cubic yard contains about 11–12 cwt on average. Ideally, silage should be 'easyfed': i.e., cut and thrown down into a space between the silage face and a barrier over which the cows have to reach to feed. This ensures that cows obtain all they require without strain on the teeth and the extra labour of cutting is very small, particularly when a mechanical cutter is used.

Feeding system

It is a mistake to assume that even full 'easyfeeding' of even the best silage will provide energy nutrients for more than maintenance plus one gallon. On the other hand, there should be sufficient digestible protein in the silage to supply the needs of two or three gallons extra. As in the case of autumn grass and kale we find that supplementation with cereal is all that is needed for the moderate yielder but again there is the practical problem of how to cash in on this asset.

There is no problem if the enterprise is a large one where both silage and grain are emptied and fed mechanically from towers. Again, there are outfits whereby the cows may be quickly yoked at troughs in the yard so that each receives its fair share. Even without yoking, if the trough space is generous and the supplement is spread along in the temporary absence of the herd, it is possible to achieve some success. Sometimes it is possible to segregate the high and low yielders into different yards from which they have access to different silos or to opposite ends of the same. This allows a chance for appropriate differential feeding.

Indeed, in these days when quick milking is a fetish and every second spent in the parlour is lamented, it is impossible to parlour-feed a high yielder with all the concentrates her yield demands. Some form of communal feeding of supplementary concentrates for part of the yield must be devised and one can only suggest that plans for doing this effectively should be made before the system is adopted.

Hay

Hay feeding may not be in favour for large herds as it is difficult to mechanize it, but it is still the main way in which grass is conserved. Good hay deserves to be fed with respect and, indeed, if barn-dried hay made from good quality herbage is available we are once more dealing with a commodity which has surplus protein to offer. Valuable food of this kind can be rationed on a herd basis by putting the requisite quantity into Norwegian-type troughs where the mesh, through which the hay must be pulled upwards, protects against waste.

Harvest by-products

Autumn, the time of the sere and yellow leaf, is the time of the straw harvest. Obviously, straw ought to be used but to have an adequate amount digested it is necessary to stimulate the ruminal organisms by providing a source of carbohydrate and nitrogen. This means using either a solid or liquid feed based on urea and molasses or else a cereal mixture fortified with extra protein. Most of the nutrients come, in fact, from the supplement and not from the straw. It is undoubtedly worth while to use straw in this way on the farm on which it is produced as cheap cereal is simultaneously available, but the economics are somewhat less clear if straw has to be brought a long distance and crushed cereal has to be purchased with it. Nevertheless, it is worth careful consideration as a means of 'buying acres'.

What now of the other by-products of harvest—dried beet pulp, stockfeed potatoes and pea haulm? Beet pulp is rightly valued as a cheap equivalent of cereal and, although not quite as high in energy as barley, it is highly palatable. Potatoes also can act as a cereal replacement, 7 lb having about the same feeding value as 2 lb cereal; a maximum of 21 lb could be used

in place of 6 lb cereal at a considerable saving in cost. Pea haulm ensiles very well to give silage equal in feeding value to medium grass silage and again there is a useful surplus of protein which makes it complementary to cereals.

Barley, beans and brewers grains

Frequent references have been made to the role of cereals as balancers of high protein bulk foods but nothing as part of the concentrate ration in their own right. Yet farmers who mix their own compounds are able to use barley for a half or more of the ration. Now that beans are showing a resurgence due to innovations in husbandry and financial incentives, the blending of beans and barley as a milk production ration has become very attractive. With a suitable mineral and vitamin supplement, equal parts of beans and barley will provide a balanced ration for feeding at 4 lb to the gallon. In practice, this would be too simple a mixture for a large yield of milk. A suitable mixture for use at 4 lb to the gallon would then be 5 cwt beans, 1 cwt decorticated groundnut, 1 cwt soya bean meal (or other high protein food), 12 cwt barley and ½ cwt minerals plus vitamins. Incidentally, brewers grains—which can be considered to be de-starched barley with resultant concentration of the protein—can also be balanced with barley. Two gallons of milk could be obtained from 20 lb wet grains with 3½ lb barley and the usual minerals and vitamins.

A fuller discussion of many of these matters can be found in various advisory leaflets obtainable free of charge from the Ministry of Agriculture, Fisheries and Food, Tolcarne Drive, Pinner, Middlesex. A selection of these is listed below:

A.L. 363. Sugar Beet Pulp for feeding
A.L. 382. Brewers Grains
A.L. 408. Kale as a Feedingstuff
A.L. 448. Hay: Quality and Feeding
A.L. 467. Potatoes as a Stock Feed
A.L. 494. The Feeding Value of Grass Silage
A.L. 524. Feeding Bulky Foods to Dairy Cows
A.L. 525. Feeding Concentrates to Dairy Cows
Short Term Leaflet No. 55. The Uses of Beans in Stockfeeding.

This article has been contributed by **S. M. Boden, B.Sc., A.R.I.C.,** who is Regional Nutrition Chemist for the National Agricultural Advisory Service in the Yorks./Lancs. Region. Previous to taking up this appointment he was lecturer in agricultural and dairy chemistry at the West of Scotland Agricultural College.

Cereals Deficiency Payments Scheme

A new edition of the booklet prepared by the Agricultural Departments on the Cereals Deficiency Payments Scheme is now available. This sets out the conditions under which deficiency payments on wheat, rye, barley, oats and mixed corn are made and the way in which the Scheme is administered.

Copies of the 1967 edition can be obtained from Her Majesty's Stationery Office, or through any bookseller, price 4*s.* (by post 4*s.* 5*d.*).

The Television Vet. (left)

Pig Farming Today

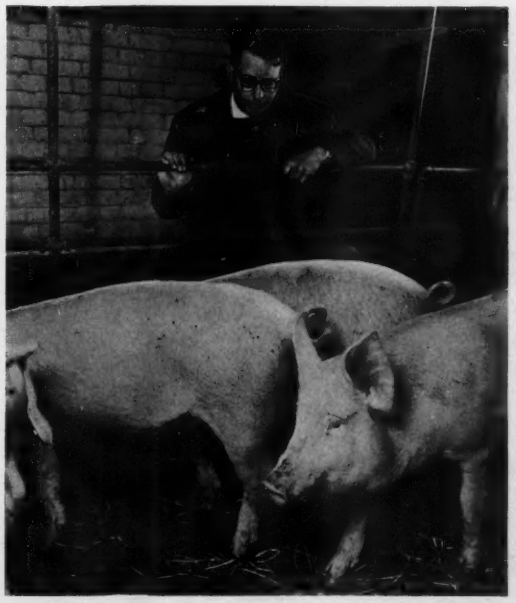
GORDON MOSLEY

LAST autumn the B.B.C. produced as an experiment a series of agricultural educational programmes for the dairy farmer, which proved so successful that another series dealing with pigs is to be launched this autumn. The trend in Britain is for pig units to become more specialized with increased attention being given to rearing more pigs per sow each year, breeding the right pig, improving conversion rate and designing or adapting buildings to provide the right environment at all stages of the pig's life. Starting with the sow we shall take a hard look at accommodation, where a case can be made for an extensive outdoor system and where indoor housing, including sow stalls, has become a practical proposition. Bill Wheeler, Vice-Principal of the Norfolk School of Agriculture, in introducing the series will stress the need for all systems to overcome the danger of a missed service, and later Dr. Lodge of the University of Nottingham will advise on the level of feeding for the pregnant sow. The importance of a good litter average is now well recognized but there are still far too many deaths before the fattening house stage, which is why John Luscombe of the Harper Adams Agricultural College is to be given a whole programme to deal with this problem, including a demonstration on how the chores of removing sharp teeth, castrating and injecting can be carried out with the minimum of disturbance at a critical stage in the pig's life. The Television Vet. will discuss the prevention and treatment of ailments and diseases in both the young pigs and adult stock. There will be an explanation of the P.I.D.A. Elite and Accredited Herd Scheme, and the advantages of using a tested boar, together with a review of steps being taken by commercial and private organizations to breed the right pig for pork, bacon and the heavy hog market.

Record keeping in the well-run unit is vitally important for the success of the enterprise. The pigman must be able to keep a check on his stock

and the farmer must be able to assess the profitability and spot any weaknesses in management. We shall not only give advice on how this can be done, but also show how producers have benefited by keeping a simple but comprehensive check on all that is going on. Finally there will be a peep into the future. The potential for A.I. is enormous once a few remaining problems have been solved, but already some producers are using this technique to advantage. The place of new breeds will also be considered by Dr. King of the Animal Breeding Research Organisation at Edinburgh, including the possible place in the future of lines derived from new breeds, particularly the Pietrian, Hampshire and Lacombe. But perhaps the most interesting development of all where large numbers of pigs are kept on a small acreage is the oxidation of slurry. We shall visit a pig farm near Aberdeen to ascertain the extent of this problem and discuss the possibilities of their oxidation system as a means of solving this stumbling block to expansion.

This, very briefly, is what the new series is all about. As much of the advice will be of help to the pigman, farmers are being asked to encourage their stockmen to watch and to discuss the advice that will be given. The series is being screened at a convenient time, starting on the 12th October at 12.30. A booklet to support the programmes will be on sale before the series starts. It is already known that a number of viewing groups are to be established and to help leaders stimulate discussion with members of the group, the B.B.C. is to make *Tutors Notes* available. These will be free on request from the B.B.C.'s Further Education Liaison Officer, 1 Portland Place, London W.1.



Bill Wheeler, Vice-Principal, Norfolk School of Agriculture, taking a look at pig accommodation

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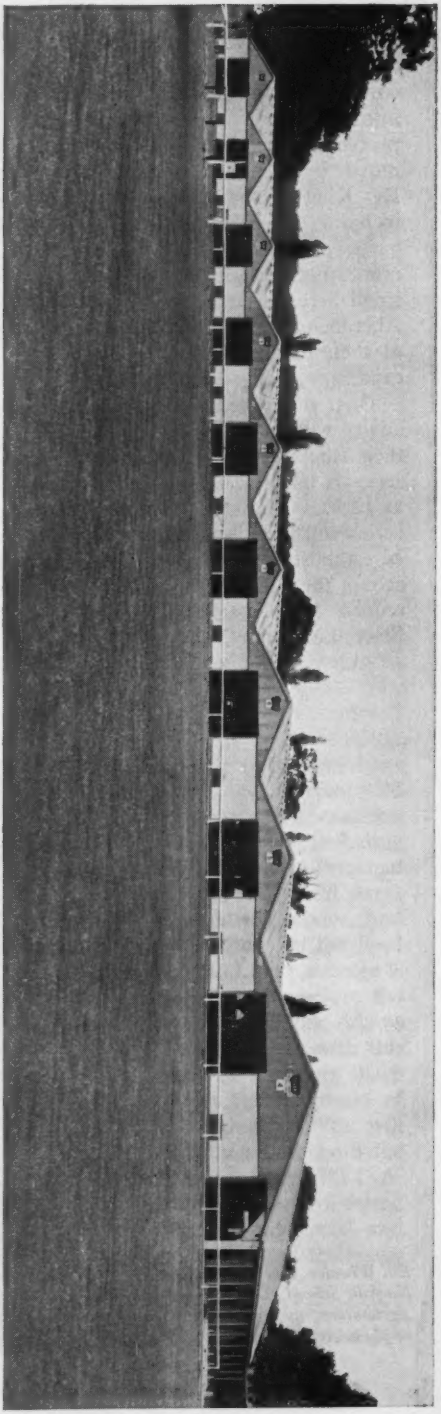

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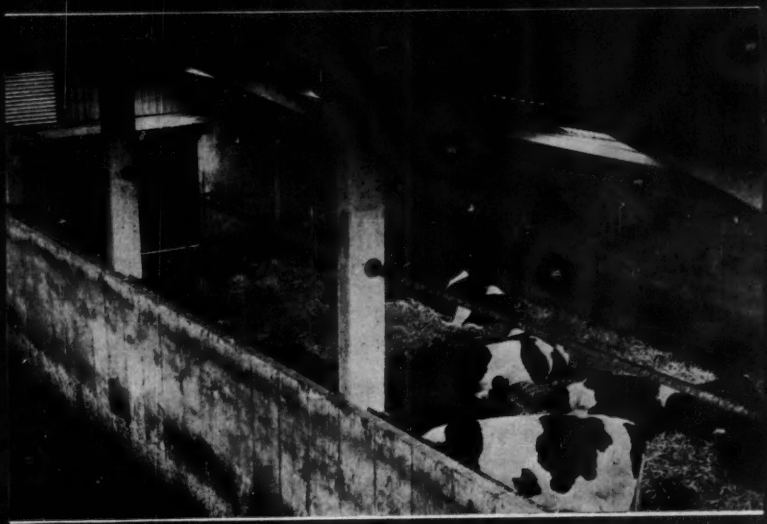

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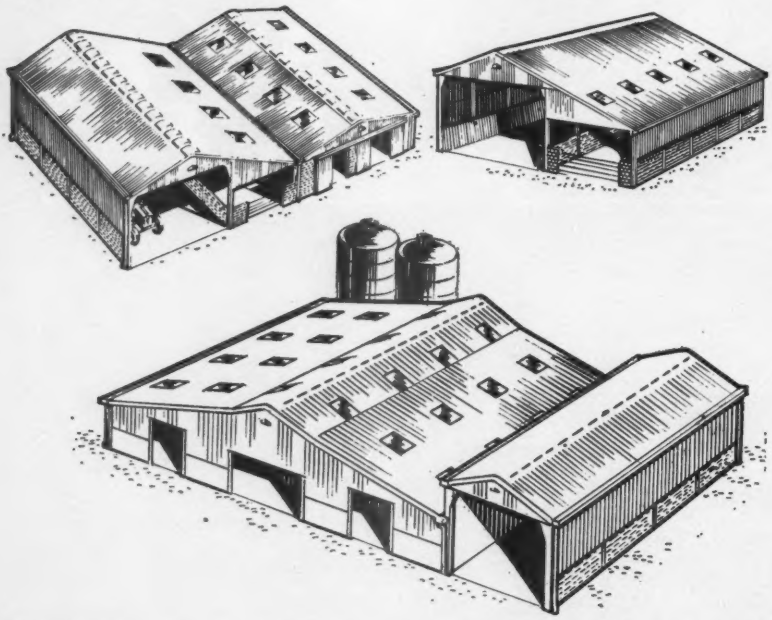

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Efficiency in Dairy Buildings

L. M. Parsons **E. R. Butler**

NEW or remodelled farm buildings are usually designed to make the best use of manpower. But they can rarely, if ever, increase the effectiveness of workers on their own. An article in the Farm Buildings feature in *Agriculture* for October, 1966, (Volume 73, No. 10, pp. 480–484—*Planning New Buildings*) mentioned some of the more unexpected consequences of installing a new livestock outfit. An attempt was made to spotlight some of the ways in which efficiency can be lost, even in the most carefully designed and constructed layouts. Amongst those concerned with farm buildings, it has become a somewhat trite saying that apparently 'bad' layouts frequently seem to be just as efficient as apparently 'good' ones. The real reasons for this apparent anomaly have never been completely explained, although opinions on the subject have been legion.

Research into layout

The Agricultural Land Service has long been intimately concerned with owners, farmers and others in the enormous task of re-equipping the farms of this country to meet the needs of the future. For this reason, a specialist group of the Service recently took on the job of trying to uncover at least some of the reasons which help to make a really successful and efficient buildings layout. The group considered that dairy buildings offered the most fruitful opportunities for study because dairying swallows up a regular and high labour content. It also means high capital investment and high labour costs. Therefore, any possible savings that could be effected, or any ideas for improvements, might be of immediate benefit, not only to the farmers concerned but also to advisers in the Service as a whole.

For practical reasons, and to make the best use of the limited time available to the group, the task was divided into two stages. The first stage, undertaken during the winter of 1966–67, was a survey of the dairy outfits of some 70 farms scattered over England and Wales. The specially designed survey was not restricted to any particular size of unit since this is rarely easy to define. The only guide was that the dairy layouts should be reasonably new and as up-to-date technically as might be possible. One or two very large units were included for comparison purposes.

Table 1

Size groups and labour force

No. of cows in milk	30–49	50–59	60–69	70–79	80–89	90–99
No. of herds	8	10	17	6	5	7
Labour force	6–1 man 2–2 men	6–1 man 4–2 men	10–1 man 6–2 men 1–3 men	3–1 man 3–2 men	5–2 men	1–1 man 6–2 men
No. of cows in milk	100–109	110–119	120–129	130–139	140–149	200 +
No. of herds	1	6	3	1	2	1
Labour force	1–1 man	5–2 men 1–3 men	3–2 men	1–2 men	2–2 men	1–2 men

After evaluation, the second stage will be a more complete and thorough study of the 'top ten', in the 'efficiency charts'. This should provide some most valuable practical tips to help in the drive for efficiency.

The ultimate decision on what *is* an efficient dairy layout depends almost entirely on its profitability in terms of hard cash. But since the group was concerned with the whole view and the total activities of men and cows as a living dairy unit, the choice of possible guinea pig farms was based on their reputation for tip-top management. The group is most grateful to its farmer friends for their willing help, patience and fortitude.

The first part of the task has been to sort out the various activities in order of efficient organization. This is by no means completed, but already some most interesting and valuable information has been obtained. It is true that some of this has only helped to prove the obvious. But, even so, at least facts and not opinions are now available upon which to base constructive advice. Some well-worn ideas have received a salutary shock, and yet others have turned out to possess quite a different character from that which has hitherto been supposed.

Considering the man

Generally speaking, because human beings and living animals are so inextricably mixed up with the design and layout of any buildings and the methods employed in them, efficient utilization depends almost entirely upon managerial capabilities of farmer and stockman. Naturally, many worthwhile improvements are solely attributable to layout. But the really striking gains only occur where the men who actually do the job have obviously been considered, not only from the very beginning but also as a continuing process. For this reason a careful study is being made both of layouts and working routines.

As a first crude indication of merit rating it was decided to carry out a series of tests on actual milking performance. It was argued that if milking was well organized then there were good reasons for considering that general efficiency would be of a similar standard. In general this was true, although there must inevitably be exceptions due to personal choice of the manager or for other reasons.

Table 2

Types of layouts and number of milking units per man

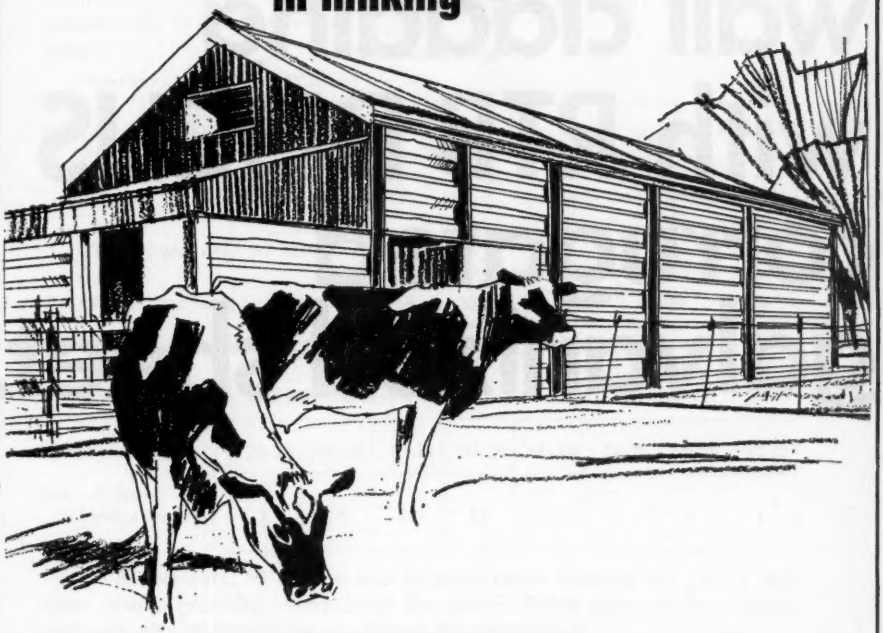
Installation	*Total*	*1 man* *Number of units*					*2 men* *Number of units*							*3 men* *Number of units*	
		3	4	5	6	8	4	5	6	7	8	9	10	8	9
Cowsheds	10	2	–	–	1	–	–	1	2	–	2	–	–	1	1
Double chute	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–
Tandem	6	2	–	–	–	–	–	–	2	–	2	–	–	–	–
Abreast	11	3	3	–	1	–	–	–	4	–	–	–	–	–	–
Herringbones	42[1]	–	10	3	1	1[2]	2	1	1	1	20	1	1	–	–
TOTAL	70														

[1]*Unit/stalls farms*: 4/8–10 4/12–2 5/10–3 6/12–3 7/14–1 8/16–20 9/18–1 10/20–2 = 42

[2]*This figure of* 1 *man using* 8 *units was observed on one farm during morning milking only.*

Whilst it would be quite unfair to draw really firm conclusions from these calculations (which were based on actual observations), the truth of the adage that there is always a better way is strikingly demonstrated. The tables show beyond doubt that some improvements in performance would be

an excitingly new and advanced concept in milking



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possible without in any way detracting from or destroying the man/cow relationship. It is hoped to discuss some possible improvements with the farmers during the follow-up next winter.

Aspects of efficiency

Some of the apparent difficulties creating these differences in performance were revealed when the actual designs of the collecting yards and parlours were studied in detail. For instance, it was found that one of the major irritations in parlour milking is the necessity for operators to go outside occasionally to brings cows in.

Table 3 **Performance data**

Cows per unit per hour (*68 herds*)

No. of cows/unit/hour	4	5	6	7	8	9	10	11	12
No. of farms achieving those rates	1	4	13	12	12	13	9	1	3

Cows per man hour (*67 herds*)

No. of cows/man/hour	10–19	20–29	30–39	40–49	50+
No. of farms achieving those rates	2	30	21	13	1

Gallons of milk per man hour (*66 herds*)

Gallons/man/hour	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99
No. of farms achieving that rate	1	15	21	13	8	6	1	1

Of the 60 parlours, 53 had no aids to bring cattle forward and only 7 had some system provided. Remedying this simple defect seems to be a cheap and easy way of improving conditions during milking.

Another exasperating aspect of cow handling is the necessity for some means of keeping back cows after milking for veterinary or AI treatment. Of the 60 parlour outfits, 33 had isolation boxes as an integral part of their layout but 27 had no such arrangement at all. With the ever-increasing necessity for animal care these days a simple shedding arrangement ought to be included in every design to help both cowman and professional visitor.

Table 4 **(Excluding cowsheds)**

Number of parlours left during milking (as a general routine)	39
Number of parlours rarely if ever left during milking	21
	60
Reasons for leaving parlour or pit	
Unsatisfactory design of collecting yards (too small, too large, wrong shape, etc.) and consequent necessity to brings cows in	28
Leave pit to feed animals or to inspect level of milk in bulk tank	6
Other jobs	5
	39

Bulk feed arrangements

Another aspect of efficiency which is being studied is the bulk feed arrangements in use. The initial sorting has been carried out on the basis of the weight of feed, the time taken to deliver it and the number of animals actually fed. As might be expected, self-feed silage took the least amount of time and effort because the cows feed themselves and because the farms using this system were extremely well organized. Automatic feed systems based on towers and augers inevitably require some attention but ran self-feed silage very closely.

Hay feeding on its own was slightly more demanding but as soon as it was combined with self-feeding silage the work content rose quite sharply. The reason for this sharp rise is in part due to the necessity for handling hay bales and the consequent operations of cutting strings, shaking out the bales and putting them into some kind of containers. A large part of the 'load' is also due to inevitable walking time and the great difficulties of getting bales from a stack, often inconveniently sited. And as soon as other feeds such as kale, fodderite, straw, grains or roots were included a steep rise in work content became obvious, even where the systems used were highly efficient. The use of troughs or mangers filled by hand increases work by well over 50 per cent. Whilst no firm deductions are possible, so far it does seem that increasing the complexity of bulk feed rations makes a disproportionate increase in work for the men.

After evaluation

It would be quite wrong to assume that layout has negligible influences on the work load. And whilst it might be interesting to compare the performance of older layouts with those under investigation the A.L.S. were only concerned with recent models. One might also draw attention once more to the fact that a great deal depends on how much capital investment was practicable when the outfits were built. After all it is at the planning stage when the choice has to be made between buying man hours as machinery or buildings in a lump for a capital payment or alternatively by purchasing these man hours over the period of use of the buildings by way of wages. Either way it seems certain that the simpler the bulk feed ration the cheaper it is to feed it. Clearly there is no one 'best' design and layout and every farm deserves to be treated as a unique situation. If this is accepted there is no reason at all why personal preference—provided it is based on factual evidence of requirements—should not play a full part in modernization.

One thing that has come out of this study so far is the undoubted fact that in every case a tremendous amount of thought and care has gone into the layouts. It is equally clear that nearly every advantage to be gained has been realized during the planning stage and that every effort has been made skilfully to apply the best available knowledge. But there always is a 'better way'. It is hoped that when the survey has been completely evaluated some useful facts will be available to help farmers meet the challenge of the future.

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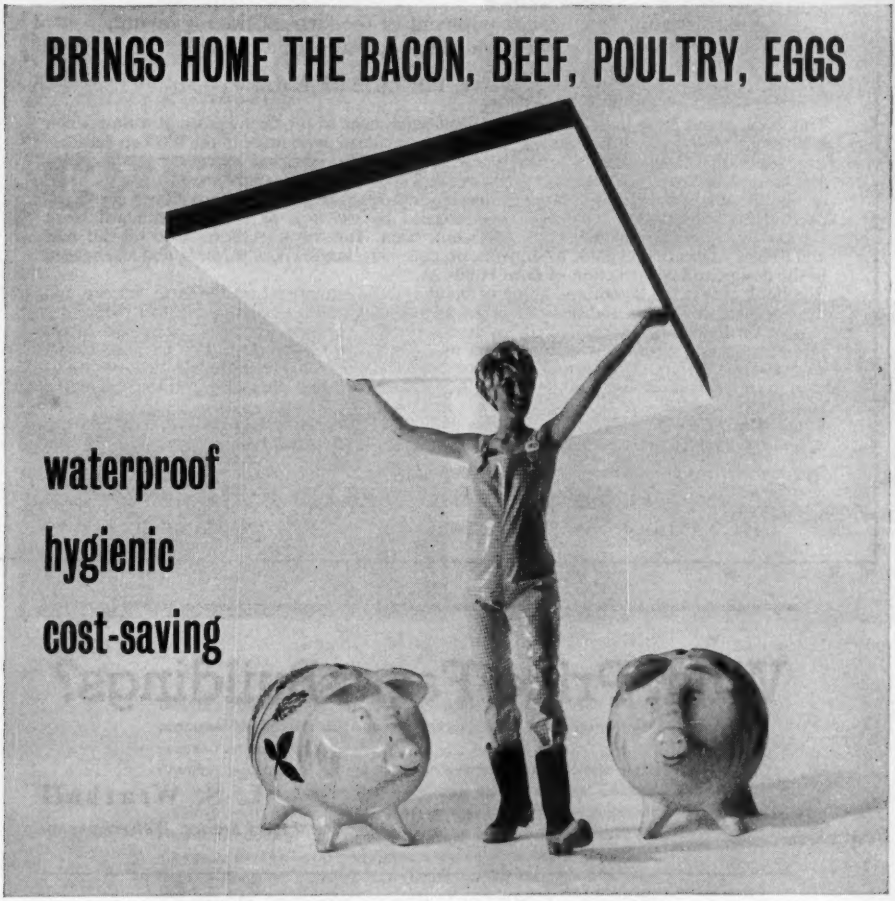

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by R. B. Sayce, F.R.I.C.S., F.L.A.S.

This book about farm buildings and the fixed equipment of the farm comes at a time when it is wise to take stock of the tremendous advances made in agriculture in the last two decades. The exceptional expenditure of capital on farms has resulted in radical changes in the functions and designs of farm buildings and other works. Indeed some advances are so rapid as to be barely out of the trial stages. During this period those engaged in the design of farm buildings, of studying the subject, have been handicapped by the lack of a single standard work sufficiently comprehensive to supply the whole need. This book is intended to fill this role and to be a reference and guide to students, practitioners, landowners, farmers, and all engaged in the design and construction of farm buildings.

The book covers the layout and siting of buildings and equipment on the farm, framed and prefabricated buildings, and deals in detail with the various storage and livestock buildings. It goes on to discuss the control of environment, the ancillary works, services, and roads, fences, gates and cattle grids. Each chapter on a functional subject deals with purpose, siting, design data, design, construction, and services. The final chapters provide detailed information on estimating, financial appraisal, worthwhileness, and preparing and understanding specifications.

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What Price Farm Buildings?

L. S. Wrathall

Agricultural Land Service Wolverhampton

THE need for capital investment analysis before the erection of new farm buildings has been accepted for some time. What has not perhaps been sufficiently emphasized is the need for a realistic estimate of the cost of a proposed building before an accurate analysis can be prepared, or before the policy which ensues can be confidently implemented.

Factors affecting prices

It is not easy to prepare an estimate for farm building work to an accuracy of say, five per cent, which is about what should be aimed at, particularly if the alteration or adaptation of existing buildings is involved. In each case there are usually a number of different factors which can affect the price; of particular importance is whether the work is to be done by farm labour

Permanent farm buildings make economic sense

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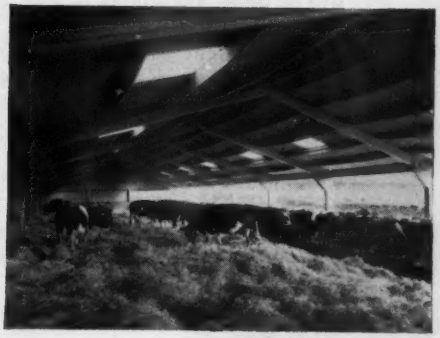

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or by contract. External factors, such as the time of year when the work will be done, availability of and demand for building labour in a particular area, have a bearing on the cost. There are also the internal factors which are an inherent part of any job. Under this heading will come site and sub-soil conditions, proximity of essential services, water, electricity, access to and around the site, and the possibility of phasing the building work with the farming programme. Sloping ground can add very considerably to the cost, particularly if the building is large or is built across the contours. In some cases this additional cost can be offset by the intelligent use of levels in the planning stage. Not least of the factors affecting the price of a farm building is the standard and quality required. This can raise certain queries in the mind of the estimator which must be settled before an estimate is made. What do we expect to get for our money? What life do we expect from our building? Is the construction proposed flexible enough to allow for change?

Before a start is made on the estimates it must be clear through the medium of drawings that the design and construction are satisfactory. Then there is the type and quality of the materials to be used which are normally described in the specifications. If the job is a large one it may be necessary to have Bills of Quantities prepared by a surveyor which describe and measure all the particular trades in the building, together with a description of the various operations. If a quantity surveyor is employed he can help to give an accurate estimate of the cost before tenders are received, provided adequate information is supplied to him for the preparation of his bills. Tenders based on Bills of Quantities are usually more competitive than tenders based on plans and specifications and it is the accepted method of tendering for large works in the building trade. Most of the more extensive improvement jobs are schemes incorporating framed buildings of one type or another and for which prices are readily available from manufacturers, the other building work ancillary to the frame usually being fairly straightforward, i.e., steel sheeting, concrete walling and so on.

Categories of farm buildings

For the purpose of estimating it is possible to categorize most of the buildings which are currently being erected on farms. One section is the framed or open type of building of which the Dutch barn is the simplest example. Also in this section are covered cattle yards, buildings for crop and implement storage, and multi-purpose buildings. The structural frames of such buildings are usually of the portal arch type. Estimates for these buildings erected complete, on prepared foundations, can be speedily obtained from manufacturers and prices are usually very competitive. Most manufacturers will include in their estimate for wall cladding, space boarding, doors, gates and for a large range of fittings. Thus, a large proportion of the estimate for a building operation can be a firm, all in, price.

Then there are the specialist buildings such as pig and calf houses, poultry houses, milking parlours and so on. Here again it is possible to get fixed price estimates for buildings erected on prepared foundations or base slabs. Package-deal buildings for self-erection come into this category. The range is an extensive one and is increasing.

Incidental building work

To arrive at a total cost we have to prepare estimates of the cost of all building work and services including incidentals.

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Apart from structural work, and specialized buildings, there is demolition, site preparation, hardcore, concreting, walling, drainage, water supply and electricity and finishings.

One method open to us for estimating is that by which the cost is arrived at from first principles by the process of 'living through' all the operations necessary to erect the building. This would probably start with the necessary demolition and clearing of the site, and would finish up with the painting. Thus, a series of individual costs is compiled which, when brought together, make up the whole cost of the building, after adding overheads and profit. It is useful to have a previously prepared check list of the various items involved with this method, in order to minimize the risk of leaving out some vital portion of the work.

A typical cattle yard construction using inexpensive standard frames

Costing by units of measurement

In addition to the above we can also estimate the cost of a building on a measurement basis provided the costs of similar buildings already erected under comparable circumstances are known. The measurements can be based on either the cubic capacity of the building in cubic feet or on the areas in square feet or square yards contained within the outside walls. Care must be exercised with this technique, to ensure that large variations in the overall size do not affect the cost per square or cubic foot and for this reason it is advisable only to compare the cost of buildings of approximately equal size. The Ministry's new standard cost schedule makes an allowance for this; the larger the building, the lower the standard cost. A simple example of a schedule of improvements based on Standard Cost is on p. 438.

Comparing prices

Unit costs are a useful way of assessing the cost of farm buildings and of comparing prices. It is possible to do this taking into account the accommodation to be provided or the tonnage to be stored, and for this reason the cost per cow or pig place or per ton of grain stored is often used. Again, the cost of these buildings should only be compared with others of similar design and accommodation, and if they do not show a reasonable identity there is obviously something wrong with the estimate. It should not be forgotten that unit costs do not cover the variations mentioned in the opening paragraphs of this article and allowances must be made for site works, services, etc., which may differ in many cases.

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Standard size: 8ft x 4ft.

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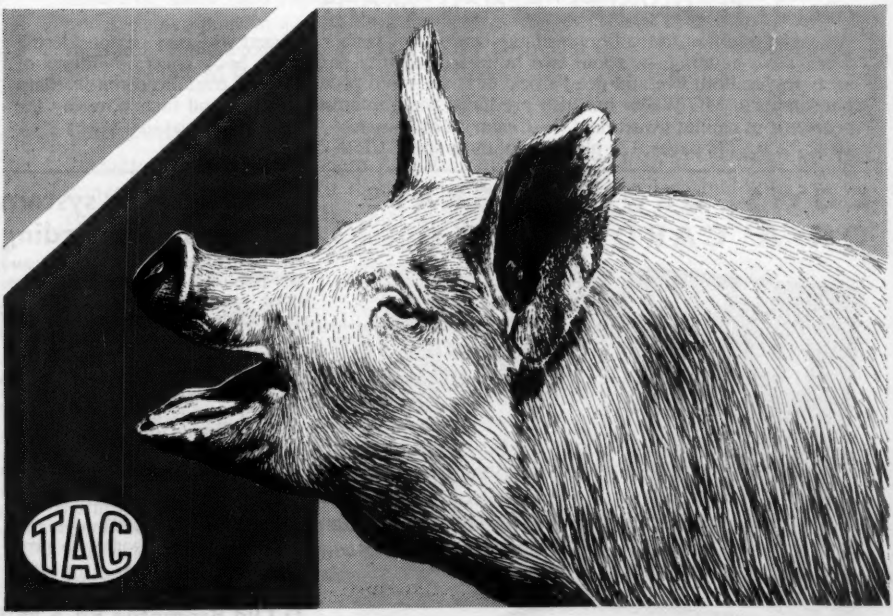

In practice, individuals who frequently have to prepare estimates, compile dossiers containing dated extracts of reliable prices from previous jobs with which they have had to deal and so have at hand a ready reference of cost

Description of approved work	Basis of grant	Estimate of Cost £ s. d.
Erection of covered yard 75 × 35ft and ancillary work in accordance with the F.I. Scheme (Standard Costs) Regulations, the plan, and following details:		
232 cu. yd/excavation @ 9*s.* 6*d.*	SC	110 4 0
85 cu. yd hardcore @ 17*s.* 9*d.*	,,	75 8 9
Steel framed building 75 ft × 35 ft × 10 ft	,,	
1,000 sq. ft @ 7*s.* 4*d.* £366 13*s.* 4*d.*		
1,500 sq. ft @ 7*s.* 0*d.* £525 0*s.* 0*d.*		
125 sq. ft @ 6*s.* 6*d.* £40 12*s.* 6*d.*		
		932 5 10
12 No. stanchion bases @ £4 9*s.* 4*d.*	,,	53 12 0
192 sq. yd 9 in. concrete block wall @ £2 5*s.* 3*d.*	,,	434 8 0
512 sq. yd 4 in. concrete paving @ 11*s.* 9*d.*	,,	300 16 0
75 ft run manger @ £2 10*s.*	,,	187 10 0
2 No. gates total 18 ft @ 17*s.* 9*d.*	,,	15 19 6
4 No. gate posts @ £2 7*s.*	,,	9 8 0
116 ft run railings @ 3*s.* 3*d.*	,,	18 17 0
11 No. uprights @ 12*s.* 2*d.*	,,	6 13 10
5 No. trapped gullies @ £3 12*s.* 10*d.*	,,	18 4 2
25 yd run 4 in. pitch fibre pipes @ 11*s.* 9*d.*	,,	14 13 9
4 No. soakaways @ £1 9*s.* 8*d.*	,,	5 18 8
Liquid manure tank 150 cu. ft @ 8*s.* 6*d.*	,,	63 15 0
150 cu. ft @ 3*s.* 3*d.*	,,	24 7 6
75 sq. ft reinforced concrete top @ 2*s.* 6*d.*	,,	9 7 6
	TOTAL	£2,281 9 6

SC—Standard costs.

It will be seen that overheads and profit are not included in the Standard Cost calculation.

information. Provided these figures are used intelligently, and the limitations of the system are realized they can be invaluable. Whenever possible, of course, they should be checked against the prices given in one or more of the various builders' price books. If more up to the minute costs are required,

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"A useful addition to the library of any landowner, farmer or agent who may be considering a new farm building. In about two hundred and fifty pages, the book covers buildings of all types for both live and dead stock. It is very well produced and contains some excellent photographs. Mr. Weller has also produced some interesting tables and facts covering the problems of capital investment."—*Country Landowner.*

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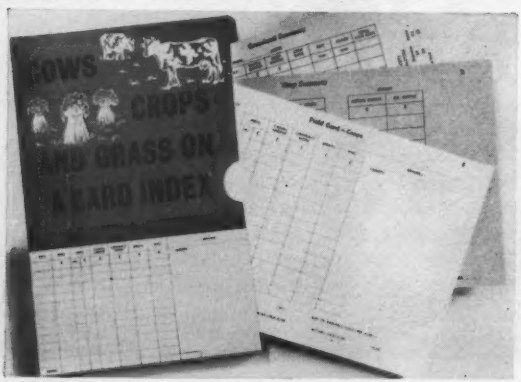

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particularly in respect of materials, these can be found in one or other of the weekly building journals which usually quote current London prices.

Estimates and tenders

It is only fair to point out that no matter how carefully an estimate is prepared, even by an expert, it can happen that a contractor's tender when received, differs from the price which has been previously worked out. This can be a great disappointment to the estimator particularly if he is paying for the work and his estimate is on the low side. It is as well, therefore, to be aware of the pitfalls in advance. All sorts of obscure factors may be responsible: the cost of wages, materials or transport may have increased, contractors may have full order books, a dock strike may be holding up timber supplies, etc. These are, of course, factors over which we cannot have very much control, but they are mentioned because they illustrate an underlying truth with regard to estimating—that it is not an exact science. Experience coupled with a certain amount of intuition is the most valuable qualification for a good estimator.

Everything connected with the proposed job must be evaluated. Good documentation is essential. Remember that the more the building contractor knows about the job the less need there will be for him to add a percentage to his price to cover himself in case he misunderstands the drawings or specification. Help him to help you, might well be a good maxim. Builders are in business to make a profit; therefore do not expect the same value for money on a small job on which the overheads and profit will form a large part of the total as with a larger job on which the reverse will be the case. The more attractive the job as a business proposition to the builder, the more willing he will be to submit a competitive tender. Furthermore, it is not generally realized the extent of the saving in cost which can result by obtaining more than just the normal two or three tenders and, a little time and trouble spent in ascertaining the names and addresses of a number of reputable contractors who are used to the particular type of work and who are agreeable to tender can be amply repaid.

Unit costs

Quoted below are some unit costs which may be helpful. It must be remembered, however, that these do not include any ancillary buildings or equipment which it may be usual to expect in conjunction with them, nor do they allow for farm improvement or other grants.

Building	Cost £
Cowhouses	90–120 per cow
Yard and parlour (bedded)	100–110 per cow
Cubicle yards and parlour	120–130 per cow
Cubicle yard only	35–40 per cow
Calf house (bucket-fed)	35–45 per calf
Piggery (intensive)	16 per pig
Grain stores (in-bin)	10–12 per ton
Grain stores (bulk, on-the-floor)	10 per ton
Potato stores (bulk)	8–10 per ton
Poultry house (battery hens)	£1 5*s*. per hen

In the final analysis the cost of a building is not just a matter of how much in pounds, shillings and pence is needed to put it up. There are also the future costs, to be borne, those of operation and maintenance. Provided this is appreciated an estimate can be prepared which can form a reliable basis for future planning.

Pasture on the Pennines

C. H. Mudd *Director, Great House Experimental Husbandry Farm*

'My income is less than the farm worker's wage, but I have my freedom, so I am prepared to continue farming this land.' The speaker was a short, stocky man of about 45. He was industrious, working 14 hours a day on his 24 acres situated on the western Pennines. He was an excellent stockman and his farm carried 18 dairy cows, four breeding sows and a few hundred laying hens. The year was 1950 and he was in difficulties. Before the war he had bought cheap concentrated feed and some hay for his animals, but the era of cheap concentrates had gone. He had tried to supplement the rationed foods by growing a few acres of kale and potatoes, but this was not enough. The answer to his problem appeared obvious—to get more acres—but this was not easy; his neighbours also valued their independence and even those who had almost given up the struggle were working in the nearby factories by day and farming evenings and weekends. If additional acres were out of the question, then the existing acres would have to produce more, but this was a difficult problem on the high lying infertile soil.

Not far away, the land grew steeper and a farm on this higher land was larger, extending to 90 acres, but it was composed mainly of rough grazing which gave way to the moor at the top of the hill. Here there was a different problem, not so much of farm size, but of extreme natural infertility giving a low output which barely supported a few milk cows and a dozen young stock. The occupier here was a young fellow of 27, this was his first farm and he was determined to make a go of it, but with limited capital it was almost a hopeless task.

Problems to solve

In 1951 when Great House Experimental Husbandry Farm was set up, two of the major problems to solve were those of these two farms, which were typical of many on the Pennines. The question was how to intensify production so that the small farm could be more self-supporting and possibly carry even more stock to enable the occupier to make a reasonable living. On the larger farms, it was how to achieve higher outputs with the minimum of capital, for most occupiers can ill-afford to invest much money on this type of land.

Both problems were primarily one of greater grassland output, for grass being the cheapest food for ruminants could provide a greater contribution

to feeding the stock and enable more cattle to be kept—generally as dairy cows. On the small farm it was a question of greater quantity per acre; on the larger farm better quality was the more urgent need.

During the war there had been some spectacular changes in the appearance of the sward by ploughing and reseeding, but a considerable area of this land had reverted to something even more unproductive than the original. This deterioration was generally attributed to bad management, unsuitable seeds mixtures, lack of fertilizers and lime, bad drainage, over-stocking, poaching and so on. It was important that the new Experimental Farm should set about finding the best seeds mixtures, optimum levels of manuring and the best management systems for these reseeded swards. A series of seeds mixtures was sown to compare varieties and plots were laid down giving a variety of levels of liming and manuring.

The plot work was inconclusive, for yields of dry matter meant little—rushes can produce a high dry matter of low feeding value to the stock. Plots sown down to S.24 ryegrass soon changed to indigenous rough-stalked meadow grass and agrostis, but dry matter yields remained high. It was clear that the animal had to come into the picture if we were to assess productivity properly. The most promising treatments were, therefore, repeated on a field scale and the output measured in terms of milk production and grazing days, or liveweight increase of young cattle, ewes and lambs.

Trial results

Results of these trials were very revealing, for they showed small differences between output of swards given equal dressings of nitrogen. Over a period of four years, there was a greater margin of milk over concentrates and fertilizer in a field containing only 20 per cent of 'good' grasses, such as ryegrass, cocksfoot and clover, than in another part of the same field containing 90 per cent of 'good' grasses which had been sown. Even on fields containing 95 per cent of 'weed' grasses, such as agrostis, fescue, nardus and rushes, it was shown to be more profitable to apply lime and fertilizers to the sward and to top fairly frequently than it was to plough up and reseed.

We had mistaken cause and effect. Fields containing ryegrass were known to be productive and we had attributed high yields to this species. Conversely rough-stalked meadow grass and poor animal performance generally coincided, so we concluded this species had a low output. In fact both these grasses were indicative of soil fertility—ryegrass will only grow under conditions of high fertility, but rough-stalked meadow grass will survive under conditions of low fertility. Given equal high fertility conditions, there is little to choose between these two grasses and both will give similar output in terms of animal production. Once soil fertility improves, the ryegrass, which starts growth rather early in the spring, will become dominant and replace the rough-stalked meadow grass.

Fertilizers or herbicides

The chemical analysis of the grasses treated with lime and fertilizers showed an immediate improvement in nutritional value. Lime and phosphates increased calcium and phosphorus for bone and milk. Nitrogen increased leaf and in consequence a more digestible, high protein plant was produced. We had assumed that lime and phosphorus were the first steps towards land improvement, with a follow-up of nitrogen at a later stage, but it soon

became clear that nitrogen was necessary in the early stages of soil improvement because the build-up of mat over the years needed both a higher pH and a better carbon/nitrogen ratio to allow the soil bacteria to get to work.

But it is no use leaving the rushes, thistles, nardus and tussock grasses to grow when rejected by the stock. They have to be removed by mechanical means—some form of topping, either the mowing machine, forage harvester or a special topping machine. If these weeds are removed at regular intervals, the other more desirable species have room to spread and soon cover the ground. In some circumstances a herbicide may be necessary to speed up the process, but on the marginal farms money is limited and if weed-killers are purchased, something else may be neglected. Where it is a case of either fertilizers or herbicides, it is undoubtedly better to buy fertilizers and rely on the topping—which should be done in any case—to get rid of the weeds.

On the farm of moderate size and low fertility, in such as the one described earlier, the answer to the problem of better livestock feeding is lime, phosphate and potash, with a certain amount of nitrogen followed up by vigorous topping. Lime is fundamental and the rest is worthless without it. We found that the type of lime was immaterial, for ground limestone, applied at 2 tons per acre was just as good as ground burnt lime at half that rate and a lot easier to put on. An experiment to determine the type of phosphatic fertilizer to use showed that the traditional basic slag was still the best, although super phosphate was nearly as effective.

Use of nitrogen

In attempting to solve the problems of the small farm, we set about finding the response which could be obtained from upland pastures by the use of nitrogen. Applications of up to 800 units of nitrogen were carried out on both permanent and temporary swards, balanced by phosphate and potash. We found that both types of sward gave economic responses up to 500 units and yields could be increased five times.

Here again the output of grass has to be translated into output of milk or meat. A trial carried out over three years showed that heavy dressings of nitrogen could more than double the stock carrying capacity of the land and at the same time fatten lambs at a faster rate. Producing a crop of grass under conditions of high rainfall and high fertilizer nitrogen is quite feasible, but the limiting factor is light intensity.

These experiments on a field scale are now being followed up on a farm scale and two farm units of 40 acres each are being compared. One is being ploughed out at intervals of several years in rotation and reseeded. The other farm unit receives equal fertilizer treatment (180 units of N per acre) but it is not ploughed. The results are based on the relative productivity of the two systems and after four years there is little difference between the two units. Sward type is relatively unimportant compared with fertility.

Utilization

A much bigger problem than actual yield is that of efficient utilization—how to get the animals to eat the extra growth efficiently without waste and without damage to the sward in wet weather. This aspect is now receiving attention and once this is solved, even the small family farm has a chance of survival, for with high grass output, coupled with intensive stocking and good stockmanship, the independence which so many strive to retain will become a practical economic proposition.

The Outlook for Cereal Varieties

W. E. H. Fiddian

BETWEEN the two world wars American wheat growing was nearly brought to its knees by the disease known as black rust (*Puccinia graminis*). It was not a new disease and it was not too difficult to breed resistant wheats, but from time to time it produced spontaneously new races which broke existing plant resistance faster than the breeder could incorporate new sources of resistance in his hybridization programme. Nowadays an impressive array of facilities and workers in Canada and the U.S.A. is entirely devoted to this one problem.

Fortunately black rust does not overwinter in Britain, and when, as sometimes happens, spores are blown here in summer from the Mediterranean countries they are not encouraged by our cooler weather. We are, however, experiencing much the same problem with yellow rust (*P. striiformis*) which prefers a cooler and more humid climate. New races, such as that which attacks Nord Desprez, have arisen from time to time but at sufficient intervals to allow breeders and the National Institute of Agricultural Botany to adjust their programmes and recommendations accordingly. More recently, two new races have occurred in rather quick succession, which between them can attack in varying degrees most of the recommended varieties. These are race 55 which attacks Opal spring wheat in particular, but also Kloka and the winter wheats Champlein, Hybrid 46, Maris Widgeon and Cappelle-Desprez; and race 60 which particularly attacks Rothwell Perdix.

Wheat

Testing varietal resistance is first performed with seedlings. If a wheat is seedling resistant to a particular race, it will maintain resistance throughout its life. If, however, it is seedling susceptible, it may still develop adult or 'field' resistance, and this requires a longer period of testing. Thus Cappelle-Desprez is seedling susceptible to some races, but develops a degree of adult resistance which in years of only moderate rust infection has hitherto been sufficient to give it adequate protection. It is now clear that in years and areas of severe attack its resistance to race 55, is insufficient.

The choice of wheat variety this autumn must depend even more than usual on disease resistance. If the crop is to follow previous wheat or barley,

Yellow rust race 60, severely attacking Rothwell Perdix (left), will not infect Champlein (right) but latter is infected to lesser extent with race 55 which in turn cannot infect Rothwell Perdix

or there is a recent history of eyespot on the field, the choice of recommended varieties still lies between the resistant varieties Cappelle-Desprez and Maris Widgeon. The latter has much the same attributes as Cappelle and is showing a higher field resistance to yellow rust.

There are again to be opportunities for a worthwhile premium on samples of a reasonably high protein content. This scheme got off to an uncertain start in 1966, because protein levels were lower than usual probably due to the long cool summer, and because there were insufficient lots of Maris Widgeon available.

Where wheat is to follow a break crop, and eyespot resistance is not required, Champlein offers a higher yield, a stiffer straw and rather earlier maturity than Cappelle-Desprez. It appears to require fairly fertile conditions and has given a better response in trials to additional nitrogen than Cappelle, although to what extent this is a truly different response or a reflection of less lodging is not certain.

With the demise of Rothwell Perdix there is a new need for recommended varieties with a broader base of disease resistance. At the time of writing, in June, the extent of field resistance of varieties to yellow rust is still not fully known; it seems already clear that Elite Lepeuple may have an advantage in this respect, as well as being a wheat of high milling and bread-making quality.

Of the newer varieties so far showing resistance to yellow rust, Mildress has been particularly resistant to mildew, while Joss Cambier and TB.205/40 are two wheats still in trials which combine high eyespot resistance with higher yield, stiffer straw and earlier maturity than Cappelle.

Barley

When improved winter barleys, to replace Pioneer, became available a few years ago, it was thought that the crop might increase substantially. This has not occurred, partly due to such factors as the autumn work load and sparrow damage at harvest, but largely because of the widespread recognition

of the increased disease hazards in an intensive cereals rotation. Not only does the winter crop reduce the period for starving take-all, but it also provides a carry-over of the leaf diseases such as mildew, yellow rust and Rhynchosporium which will spread to the spring-sown crops. In Holland this is considered sufficiently important to warrant imposing a ban on winter barley in the main spring barley malting area.

Maris Otter is now widely accepted as a malting barley which is an improvement over Pioneer in almost all important characters, except in areas where Rhynchosporium may be serious or in the North where its winter hardiness may be insufficient. Of the six-row feeding barleys, still the highest yielders and the earliest maturing, Senta has been slightly higher yielding, stiffer and of better grain quality than Dea.

Oats

The oat crop is once again attracting interest. Compared with barley it is relatively free of disease and it is interesting to note that its declining acreage seems to have been accompanied by a reduction in leaf diseases. Winter oats have been considerably higher yielding than spring oats and are less prone to frit-fly and drought in the spring. The three recommended varieties are all similar in yield. Peniarth is the most winter hardy, Maris Quest the stiffest and Padarn the earliest.

The other advantage of winter oats is their lower husk content compared with spring oats, and it appears to be this aspect of feeding value which will ultimately determine to what extent the oat crop can recover its popularity. As increasingly intensive livestock rations are required the oat becomes correspondingly unsuitable, at least for the non-ruminants. It has only 90 per cent of the energy value of barley and only 85 per cent of the value of maize. This is unfortunate because oats have a better amino acid composition than the other cereals, especially with regard to cystine, lysine and arginine, and have a total protein content superior to that of barley and maize.

From time to time breeders have tried to develop huskless oats, using the species *Avena nuda*. There has recently been considerable progress in this field and we certainly should not lose sight of the oat crop.

Intensive barley

The single biggest need in intensive barley growing is for the introduction of resistance to take-all, but, unfortunately, this is unlikely to be achieved in the foreseeable future because of the lack of a useful source of resistance. A reasonable level of mildew resistance has been incorporated in most of the newer varieties but here again the presence of different races of the disease leads to an unstable situation. One of the best sources of resistance hitherto available is derived from the barley species *Hordeum spontaneum* and is incorporated in Maris Badger, Maris Concord and Impala. This source is no longer satisfactory on the Continent and its future value in this country is currently uncertain.

It seems possible that the level of Rhynchosporium infection, which for three successive years rose sharply, may have for the time being reached some sort of equilibrium but will still vary from year to year according to the season.

For malting purposes Maris Badger is now fully accepted by the trade, and has the advantage to the farmer of a stiffer straw than Proctor. Zephyr and Mosane also have a similar malting analysis to Proctor.

Although of a different grain appearance by traditional standards, Zephyr is already being widely accepted for malting, and can thus be regarded as a dual purpose barley. It has given a national trial yield some 8 per cent above Proctor, and this difference is higher still in the North, where Proctor is also less suitable on account of its later maturity and tendency to grain splitting. Mosane may also be useful in the North on account of its extra earliness.

As a feeding barley Zephyr has a slight yield advantage over Impala and Deba Abed, but its straw is not as stiff and its mildew resistance has not been as high.

The beginning, or primary focus, of yellow rust infection which will quickly spread to the remainder of the plot of this susceptible variety

Deba Abed has seldom been lodged in trials and it seems likely that it can be expected to remain standing at whatever is the maximum level of nitrogen manuring for obtaining an economic response. This is a new situation in the cereal crop, which some of the newer stiff spring wheats are also approaching. For a variety as late as Proctor, indeed, even later in the earlier stages of growth, Deba has been yielding surprisingly well in the North. It appears to require fairly fertile conditions and has not performed so well on drier soils.

Impala is less exacting in its requirements; it has been found in trials both here and in Holland, where it was bred, to be suitable for lighter soils and it tolerates late sowing better than many varieties. Unfortunately it seems to be rather prone to leaf yellowing under adverse conditions in the spring and there was some evidence in 1966 that its yield suffered on this account.

There is thus not very much to choose between Zephyr, Deba Abed and Impala when all their characteristics are considered. Zephyr gives a chance of a malting sample; Deba is likely to be the most satisfactory for very

fertile conditions and Impala is especially suitable for the drier soils and late sowing.

The problem of ear loss by wind action before harvest seems to be increasing, especially in the North. Complaints have been levelled particularly against Impala and Deba Abed; these are the varieties least likely to lodge and therefore the most exposed to wind damage. It is difficult to see an easily attainable solution to this problem.

Climate and disease

The climate of the South-West poses special problems in disease resistance. Winter wheats, especially Cappelle-Desprez, are very prone to Septoria; the winter barleys Maris Otter and Maris Puma, and the spring barleys Deba Abed, Cambrinus and Mosane should not be grown there due to their low Rhynchosporium resistance; and the high level of mildew demands a resistant variety where possible. In practice Proctor still remains one of the most reliable spring barleys in this region.

Of the spring barleys still in trials it is not obvious yet that there are any which are particularly outstanding, although the Dutch variety Sultan is clearly interesting on account of its high mildew resistance. Nevertheless there is every likelihood that we shall continue to see improvements in cereal varieties.

This article has been contributed by **W. E. H. Fiddian, M.A., Dip. Agric.,** who has been head of the Cereal Variety Trials Section of the National Institute of Agricultural Botany at Cambridge since 1960.

Fire Blight and Secondary Blossom

This may be another bad year for fire blight outbreaks and growers in the areas threatened by the disease should do everything possible to suppress secondary blossom on their pear trees.

1966 was by far the worst year for fire blight since the disease was first reported in this country. This was largely due to the abnormal amount of secondary blossom produced, as it is mainly in secondary blossom that the disease spreads. The abnormal production of secondary blossom is believed to have been caused by the mild winter, followed by spring frosts which checked growth.

In many areas these conditions have been repeated this year and another abnormal flush of secondary blossom may result.

Growers should do all they can to pinch out secondary blossom on pear before it opens. Laxton's Superb trees that have been grafted over to another variety should not be overlooked. Secondary blossom is often produced on the remaining Laxton's Superb wood of such trees and, if this becomes infected, the grafting will have been wasted. All water shoots forming on the remaining Laxton's Superb wood should also be removed to reduce the risk of the tree becoming infected in future years.

Any signs of fire blight infection should be reported promptly to the Ministry, as required by the Fire Blight Disease Order.

3. The Vale of the White Horse Berkshire

M. W. Dymott *Deputy County Agricultural Adviser, Reading*

THIS vale, full of feature and interest, is named after a symbolic and medieval horse, cut out of the turf on one of the highest hills bounding the valley. When one thinks of the technique and, perhaps humour, which our ancestors displayed when producing place names, this is not so surprising. In the valley we have such names as Upton, while on the top of the chalk hills, known as the Berkshire Downs and which mark the southern limit of the vale, we have such places as Lowbury Hill. But if logic is absent from some of the nomenclature, it is present to a startling degree in the apportionment of land among parishes and farms. Along the A 423 from the Goring Gap to Wantage and along the B 4507 to the Wiltshire border, one is struck by the number of farm houses, buildings and villages near the road and the paucity of them if one strays up the barley covered slopes to the south. So many of the farms run to some 100 or 200 acres on the thin chalkland with little fencing, shelter or water for livestock but also have a good proportion of the deeper soils of the Upper Greensand to the north of the road. This land has given good crops of wheat and grass to many generations. The parishes and many of the farms are thus long and narrow, presenting something of a transport and communication problem even today. These are the farms where cereal growing, particularly barley, has dominated the scene for at least twenty years, fertilizers from the bag doing for many acres at least part of what sheep used to do for a smaller area. It is on these thin chalk soils that many a good farmer has quietly been growing barley year after year at an economic yield. Breaks where found necessary have taken the form of short leys, fallow, vining peas for which the local market is very limited, herbage seed and, more recently, oilseed rape and beans.

It was on just such a Chalk and Greensand farm which had grown leys to feed a suckler herd as a break crop from cereals, that a search for a more profitable enterprise led the owners to the development of the system of selling autumn born calves fat at 18 months of age, having spent a summer on intensively managed grass. This was started about the time when the Grassland Research Institute and High Mowthorpe Experimental Husbandry Farm were still in the early stages of developing this system. The problem of effectively using surplus grass from the paddocks led the same farming

partnership to install barn hay drying facilities and use them to the advantage of both grass and stock. In fact last winter the cattle were fattened on hay and barley with no protein supplement.

Among the villages along this road are many horse-training establishments and the early morning motorist has to be wary lest he clash with a string of horses crossing his path on its way to the gallops at the top of the downs. The less well informed townsman must also be wary of picnicking on these sacred swards, lest his family become the quarry of the indignant guardians.

The western and lower parts of the central vale present a more pastoral scene. The soils have developed largely from the Kimeridge and Gault clays. Hedges, ditches and drainage systems based on ridge and furrow, assume an importance and the farms tend to be smaller. Much of the land is devoted to dairying but where contour or soil texture allow, wheat and barley are also found. Towards the east of the area where the Thames Valley and the vale blend into one another, most of the soils grow good cereal crops but alternate husbandry predominates. The leys and old pastures are mostly used by dairy herds and their followers but one does not have to travel far between herds of beef cattle.

The dairy industry has been and still is changing apace in this area as elsewhere. To expand the herd or get out of the market altogether is the dilemma time and again. The decision so far has depended on the farmer's own inclinations towards milking more than any other factor. Lack of capital restricts and delays expansion but rarely prevents it if the farmer is sufficiently keen and determined. Such attributes have often been exploited in this area, so that a man has achieved his aim of finding a living without the aid of the monthly milk cheque and all that it entails. The net result is that the area retains about the same number of cows but in fewer herds. There are many abreast parlours and a number of cowsheds which serve their purpose well. On other farms a preference has been shown for herringbone parlours and several very effective ones have been erected, particularly those built more recently. Despite the plentiful supply of straw to absorb slurry, the cubicle is to be found on several farms. High dry matter, tower silage with automatic feeding, cubicles and organic irrigation has been installed by one pioneer and another has preferred to combine loose housing with a 'Lazy Susan' trough at the bottom of his tower.

Most aspects of pig production are represented. Outdoor weaner production is to be seen on the downland slopes and elsewhere can be found the sophistication of minimal disease pigs resulting from hysterectomy and controlled environment. The Universities of Reading and Oxford have their influence on the area in many ways and Cambridge and Edinburgh University pundits have participated in a local enterprise to establish the Camborough as a new hybrid pig.

Landmarks in the area have, until recently, been either natural like the chalk outliers called the Wittenham clumps or connected with farming, one notable case being a large maltster's store, often referred to locally as 'The Cathedral'. But now Harwell is more famous for its atomic energy connections than its cherry orchards, though these are still the delight of the traveller in spring when the trees are in bloom and again in the summer when the produce is available at the roadside.

It has often been said that people are more important than places. Should the reader gain the impression that this area is farmed at a high standard by basically modest yet enterprising men, then he would be correct.

New symbol for British industry's metric change

The Change to Metric

L. Woodhams *Agriculture Land Service, Cambridge*

IN 16 months time, that is January, 1969, the construction industry will change over to metric dimensions on all its new work, and this will include farm buildings.

Preparation for this change started in 1966 when the various sections of the construction industry were asked to comment on a draft programme published by the British Standards Institute, who are the organizing body for the change in Britain. This draft was so well prepared that it has been accepted virtually unchanged and we now look forward to the completed change by 1973. It is important to remember, of course, that our currency changes to a decimal system in February, 1971.

It is very easy to acknowledge and, indeed, to accept the arguments for metric dimensions. Units of 10 instead of say 12, 3, 9, 2240, etc., should be much easier to grasp and 'do' arithmetically, but how are we to change?

Our dimensions, apart from their lack of relationship (why 12 inches and then 3 feet?) seem to be selected entirely at random, and it is only in recent years that the advantages of a rationalization of dimensions have been driven home by the increasing use of industrialized methods of construction. One must acknowledge the good work done by the Ministry of Agriculture soon after the last war, in guiding the production of a dimensionally rationalized set of components for agricultural buildings (the 'M.A.F.' Components).

Apart from that time no opportunity has presented itself until now for critically examining dimensions and a great effort must be concentrated in a fairly short time to select the right guides for future development.

In building terms the range of dimensions is likely to be limited from probably 1 millimetre for a butt joint to say 200 metres for an overall length. Between these limits sizes must be determined but depending upon the scale we ought to be able to establish preferred increments of size. For example, in Imperial terms the bay width of a structural frame could be limited to 1 ft increments, a door opening to 4 in. increments, a farrowing crate to 1 in. increments. Such a rationalization must reflect in production efficiency, and we would expect, in financial costs.

With the metricization of dimensions we shall all need to re-learn a visual/imaginary scale. Where metres are concerned we shall, no doubt, relate them to yards and so get a grasp of size but where a lesser unit than the metre is expressed, some original thinking will be necessary. Arguments are put forward for continuing Imperial dimensions alongside the metric but against this can be cited the case of temperatures. The continued use of Fahrenheit equivalents after giving the temperature in Centigrade has not encouraged us to relate Centigrade to our imagination.

The general scales for drawing production should not create any real difficulties. Scales of 8 ft to 1 in. and 4 ft to 1 in. are not very different from 1/100 and 1/50; while 1/500 and 1/2500 are common scales for site plans and maps.

In land measure there will be a need for decision on which dimensions to adopt as 'preferred' and then weights must necessarily follow suit.

The adoption of preferred dimensions or sizes will eliminate the proliferation of terms which have grown with agriculture. We shall undoubtedly be sorry to see the 'sack', 'coomb' and 'quarter' go out of our agricultural language, but local nomenclature must invariably give way to national and indeed international standards, if we are to take every advantage of technological advances. And whatever our views of the Common Market, we would at least have a common system of dimensions.

During the next 18 months it is most probable that some information will start to be produced in metric, and for some time after that both systems, Imperial and Metric, will run alongside each other before the final change for any one section, manufacturer or even adviser, can be completed.

Now, therefore, is probably the time to start thinking in metric terms so that when the first publication advertising some product with its dimensions in metres, or millimetres appears, it will not immediately be dismissed because it 'doesn't register' in size.

The symbol heading this article is the national symbol for the change to metric but the British Standards Institute strongly stresses that it must not be used, either by direct reference or by implication, to suggest that products or services are necessarily approved by BSI.

in brief

- **Veterinary Laboratory Jubilee**
- **Food for pigs**
- **Mini milk tanks**

Ministry's new Permanent Secretary

Sir John Winnifrith, K.C.B., who has been Permanent Secretary of the Ministry of Agriculture, Fisheries and Food since 1959, will be retiring at the end of the year to take up the appointment of Director General to the National Trust. Sir John will be succeeded by Mr. Basil Engholm, C.B., who has been a Deputy Secretary since 1964.

Food for pigs — and thought

At a time when farmers are looking over the 'hedge' of the English Channel at the farming of The Six, the study by Sturrock and Ridgeon* of pig production costings in Denmark and Holland compared with those in England calls for close examination. Danish costs are the lowest in the three countries, and since the aim of the Danes and the English producers is largely identical—the custom of the British housewife—it is well worth while investigating why their costs are lower than ours.

A number of factors are involved in the explanation of this disparity, such as stricter rationing and the use of individual feeders for dry sows, the fact that we get less pigs per sow per year, our food conversion rate is lower and our labour and overhead costs are higher.

But to take the single highest factor operating against us, all too often the rations we use are too expensive. The misplaced complacency about feed costs exhibited by some pig fatteners is little short of alarming. For them a high-priced feedingstuff seems to have some built-in magic of its own; they rest optimistically on the belief that the conversion rate will thereby be enhanced, without checking for themselves whether indeed they do achieve it. As the authors of this study point out, an extra 4*s.* per cwt spent on feedingstuffs 'produces as much effect on profit as a fall of 0·6 in the food conversion rate or four extra weaners per sow'.

Basically, the cost of pig rations in Denmark and England is not dissimilar, but Danish farmers make use of co-operative societies that distribute feedingstuffs with great efficiency. British farmers with larger herds should be able to buy on a bigger scale and on better terms than the Danish farmer; forward buying at harvest time or co-operative buying should be more fully explored.

The Danish farmer does, of course, have the advantage of skim milk, which enables him to use a cheaper meal, but this advantage is growing less primarily because an increase in pig numbers means less skim milk available per pig. Then

*Farm Economics Br., Sch. of Agriculture, Cambridge, 4*s.*

there is the time and trouble of feeding it. So ultimately there is no reason why English pig men should need to pay more per cwt for feedingstuffs than his Danish counterparts.

In short, a shrewd approach by every pig farmer to what goes into the making of every pound of liveweight gain is a basic essential whether or not we are competing with the Dutch and the Danes within or without the area of the Common Market.

Central Veterinary Laboratory, Golden Jubilee

In the presence of a large number of distinguished visitors from home and overseas, the Central Veterinary Laboratory, Weybridge, celebrated its fiftieth year during the week commencing 10th July. The Minister of Agriculture, the Rt. Hon. Fred Peart, attended the Open Day on 11th July.

It was in 1894 that a laboratory was first established in the basement of the premises occupied by the Ministry (then the Board) of Agriculture in Whitehall Place for veterinary diagnosis. The work soon outgrew the accommodation available and in 1908 Alperton Lodge, a country house near Wembley, was converted for use as a laboratory, both for diagnosis and research. Again, the premises proved to be inadequate for the work that had to be done and in 1914, the Development Commissioners voted a sum of £28,650 for the purchase of 40 acres of land at New Haw, near Weybridge and the erection of suitable buildings. In 1917, a single building containing five laboratories and administrative offices, together with associated animal accommodation, with a staff of seven professional officers and nine technicians and animal attendants, was brought into use.

Over the 50 years the pattern established between 1894 and 1917 has continued and the Laboratory has long since outgrown the facilities provided in 1917. The original 40 acres are now practically wholly covered with buildings—new laboratory blocks and extensive animal accommodation—although most of the original buildings remain, extended and altered to some degree, but still recognizable from old photographs. Around 500 acres of farmland adjacent to the Laboratory site has gradually been acquired and the number of staff has grown in proportion. There are now 86 professional staff supported by 311 technical and scientific staff and 88 farm staff together with administrative and common service staff.

'Weybridge', as the Laboratory is known throughout the world has always been an essential and integral part of the Ministry of Agriculture's Animal Health Division. It provides a diagnostic service for notifiable diseases (except foot-and-mouth disease); it produces vaccines and tuberculin; its past achievements include notable contributions to research work in a wide field including brucellosis, vibriosis and tuberculosis, the development of P.P.D. (purified protein derivative) tuberculins and the identification of Newcastle Disease in 1927 as a new virus disorder of poultry. The Laboratory has played an important part in the programme for eradication of bovine tuberculosis and swine fever in Britain and is at present heavily involved in the newly introduced brucellosis campaign. The present research programme, as in the past, has as its aim the control and amelioration of animal diseases.

In September, 1962, the World Health Organisation appointed the Laboratory as its Third International Laboratory for Biological Standards, a very high honour indeed and one which reflected the reputation that 'Weybridge' has throughout the world. The Laboratory's world activities are not, however, limited to biological standards. A constant stream of overseas research workers and students visits the Laboratory each year to discuss and seek advice and information on their particular branches of veterinary science. Facilities are provided for the training of scientific and technical staff from developing countries and the Laboratory staff themselves go out on assignments overseas to these countries. At present 17 staff are away on assignments of this nature. As the Minister said in his speech on 11th July, 'This is very important. On many occasions I have stressed the fact

that science must transcend all barriers—geographical, political or ideological. The benefits of scientific discovery—and this very much includes veterinary science —should be available for the world to share.' 'Weybridge' hopes that over the next 50 years it will be able to continue its contribution towards this aim.

Mini milk tanks

In a few years time the wayside churn will be as much a museum piece as the wooden milk bucket if experiments now being conducted by the milk boards in England and Wales, Scotland and Northern Ireland are successful.

Between now and the end of next year all three boards will be farm testing new kinds of milk tanks small enough to be portable and so bring to the smallest dairy farmer the same convenience of bulk collection as at present is enjoyed by the big producers. Of the 96,000 milk producers in England and Wales, it is estimated that some 25,000 small men could benefit if the right kind of tank can be evolved at the right kind of price—something under £200 is the aim. British, Dutch and W. German tanks of 35 gallons capacity are being tried out in the Milk Board's Norwich area.

Agric.

Report on Animal Health Services in Great Britain — 1965

The introduction of animal diseases into Great Britain was once again successfully controlled in 1965. This is shown by the 1965 Report on the Animal Health Services, published by H.M. Stationery Office, price 8s. (by post 8s. 6d.).

Outbreaks of fowl pest were the lowest since 1950 and those of swine fever the lowest since 1949. Scotland was kept completely free from these particular diseases.

The steady decline in the incidence of tuberculosis in cattle continued and there was a significant drop in the number of herds with reactors.

The Free Calf Vaccination Service against brucellosis made good progress and the number of calves vaccinated in 1965 showed a 25 per cent increase on the figures for 1964.

After three years' freedom from foot-and-mouth disease, a single outbreak, confined to one farm, occurred in April.

The incidence of anthrax, which had increased markedly at the end of the previous year, continued to be high during the first five months of 1965. It then returned to a more normal level, so that the total outbreaks for the year were only slightly higher than those for 1964.

It is noteworthy that the compensation paid in 1965 for stock slaughtered because of foot-and-mouth disease, swine fever and bovine tuberculosis was only about 45 per cent of the £2 million paid in 1964 and 17 per cent of the £5 million paid in 1963.

Books

The Rhododendron and Camellia Year Book 1967. Royal Horticultural Society, 21*s.* (by post 24*s.*).

The continuing keen interest in rhododendrons is clearly demonstrated by the number of contributions in the 'Rhododendrons Notes', which in this Year Book run to eighteen pages and are thus rightly afforded special mention in Sir Giles Loder's foreword. There are no less than eleven contributors, and their subjects range widely from one of Kingdon Ward's letters giving a brief insight into conditions in camp on the Tibet-Burma border, to notes on weed-killers, dead-wooding and an article on developing better forms of *Rhododendron mucronulatum* in America.

While rhododendrons are given greater coverage than camellias, apart from the description of one new species, *R. viscidifolium*, camellias (including four species of *Theopsis*) are the subject of the only taxonomic account in the volume. This is a paper by Dr. H. H. Hu, first published in 1965, describing eleven new Chinese species and two varieties with the descriptions translated into English from the original Latin and includes four splendid illustrations reduced to about three-quarters of the originally published size. The scales in the legend, however, remain unaltered and are consequently incorrect. Two further papers on camellias at Leonardslee, Sussex and in Melbourne, Australia, include information about many varieties, while articles dealing with the use of artificial light and bench grafting are relevant to the cultivation of both camellias and rhododendrons.

Evergreen azaleas are discussed in two short notes, and Michael Black, reporting on the behaviour of his New Guinea rhododendrons under cultivation, provides an encouraging sequel to last year's stimulating description of his expedition to collect them. In the present volume, the exciting prospect of areas still unexplored botanically in the Far East, with the possibility of many new rhododendrons yet to be found, is revealed by E. H. M. Cox, who draws upon his own experience as well as that of other collectors to demonstrate some of the difficulties which resulted in collecting in the past being often restricted to established tracks.

Many excellent rhododendrons already in cultivation are mentioned in several interesting accounts of gardens. These include a well-illustrated review of Ballywalter Park and Woburn Lodge in Northern Ireland, and Scotland is particularly well-represented by the seven gardens visited during the Rhododendron Group Tour and by the garden of Larachmhor, Arisaig. It is indeed heartening to learn of the efforts of enthusiasts from the Royal Botanic Garden, Edinburgh, to revitalize this neglected garden which still contains many rarely-grown species and plants under collectors' numbers.

Reports on the rhododendron and camellia shows, competitions and awards in 1966, record most useful information and the supplement to the International Rhododendron Register is a valuable addition. In this twenty-first volume a new format is adopted in which the thirty-eight black-and-white photographs and four drawings appear on the text pages. This has generally resulted in closer correlation of text and illustrations, although it is perhaps unfortunate that several photographs of plants that received awards are far removed from the relevant text, and a few, for example, one of *Rhododendron* 'Zyxya', fig. 19, are actually on pages otherwise devoted to camellias. However, almost all the illustrations including sixteen in colour are excellent, and handsomely enhance an issue of the Year Book worthy of its coming of age under the sponsorship of the R.H.S.

M.J.S.S.

Agriculture: The Cost of Joining the Common Market. European Series No. 3. T. K. WARLEY. Political and Economic Planning, 1967. 7*s.* 6*d.* (by post 8*s.* 3*d.*).

Several attempts have already been made to assess the probable effects of the United Kingdom adopting the Common Agricultural Policy of the E.E.C. The issues at stake—balance of payments, cost of living, farm incomes and Commonwealth trade—may be well known but this timely report clearly contains the most balanced and penetrating appraisal of the implications for the United Kingdom which has yet been made.

Following an extremely lucid description of developments which have occurred in the

agricultural policy of the E.E.C. and the United Kingdom in recent years, Mr. Warley proceeds to his estimate of the probable effect our joining the Community would have on the cost and volume of food imports, the retail food bill and gross farm income. In so doing, he has taken into account changes in the United Kingdom pattern of output and consumption which might be expected to result from the application here of Community prices. Moreover, an attempt is made to estimate the consequences for the balance of payments if the United Kingdom does not succeed in joining.

It is fitting that the study has attracted much attention but, at the same time, it is perhaps unfortunate that most of the reviews have attached a considerable amount of weight to the absolute magnitudes of the changes shown. For example, the warning of the effect of 'the unseemly spectacle of arbitrary assumption being piled on top of conjecture' when estimating the net cost to our balance of payments of £212 million if we join the Common Market seems, in most instances, to have gone unheeded. Such a comment cannot of course be held against the author. He has fulfilled his task admirably. Having got this far, it would now be extremely valuable if the exercise could be taken a stage further and an attempt made to determine what the consequences of a 2½ per cent increase in the cost of living and a burden of a further £200 million would be for the British economy.

R.C.R.

Forestry and Pheasants. Ely Game Advisory Service Booklet No. 15, 1966.

This is another of the well-written series of advisory booklets produced by the Ely Game Advisory Station at Fordingbridge, Hants, which are available to shoot-owners *free of charge*.

Ten years ago, when the first edition was published, forestry and pheasants were usually regarded as alternatives. It is a measure of the change in outlook and management technique since then that commercial timber production or planting for shelter are now considered to be fully compatible with planning a good shoot. The fact should not be lost sight of that such a multiple use of woodlands or shelter belts can enhance the value of a property.

Four main features which are desirable in planning woodlands for high sporting qualities are referred to: protection from wind, breeding cover, holding cover to retain both wild and reared birds and provision for showing high pheasants on a shooting day. The booklet gives advice about how these requirements can be obtained, and includes detailed descriptions of basic layouts for a game covert, a shelter belt and a game spinney as well as how to incorporate the necessary features in bigger areas of woodland. Excellent diagrams and photographs illustrate these sections.

There is no feature of game coverts which produces more arguments than the kinds of shrubs which are suitable for cover and food. As the author points out, little research has been done on the subject and recommendations are often made on hearsay or guesswork. Fortunately, the work done by the Ely Game Advisory Service sheds a lot more light on this confusing subject.

Anyone interested in shooting will certainly benefit from reading this useful booklet.

R.W.S.

The Influence of Urbanization on Farm Ownership and Practice. RUTH GASSON. 1966.

This survey deals with the effects of urbanization in South-Eastern England and reveals the implications for the rural economy and for the region. Its findings are applicable to those areas in lowland Britain where town development is encroaching on formerly remote rural districts. Whilst the report does not suggest solutions to the problems that urban development raises, it does clearly outline the changes that take place. This makes it a useful reference record.

Using the National Farm Survey of 1941 as a base the report indicates the degree of change over the last two decades, in farm tenures, part-time and whole-time farming, farm systems, sizes and performance. The observant are able to see changes in land use, cropping and stocking patterns. What is less obvious are changes in farm structure, farm organization, farmer motivation and social background. In these respects it is a salutary lesson to discover how little rigidity these factors have in a rapidly urbanizing society.

The trends towards increasing owner-occupation and the polarization of farms into large and small units are national and deep-seated and do not solely depend on urbanization. The survey demonstrates, by comparison of areas more and less accessible to the commuter, that urbanization accelerates these trends.

Part-time farming has been practised for very many years, even though rural com-

munities have regarded its practitioners as somewhat beyond the social pale. The report confirms the findings of other workers that one of the results of urbanization is the emergence of a new type of part-time farmer with a city background who has different aspirations.

Individuals concerned with problems in the field of land use, structural change and adaptation of farming systems to changed conditions should have this book in their reference library.

Copies may be obtained from the Secretary, Department of Economics, Wye College, Ashford, Kent, price 10*s.* 6*d.* (including postage).

H.V.D.

The Pattern under the Plough. GEORGE EWART EVANS. Faber and Faber, 1966. 35*s.*

Sub-titled 'Aspects of the Folk-life of East Anglia', this book is the third in a trilogy of which the other two are *The Horse in the Furrow* and *Ask the Fellows who cut the Hay*. The economic and social changes which have swept rural Britain like a tidal wave since the first decade of the present century have submerged a whole culture that had its roots deep in antiquity.

East Anglia is a natural geographical unit, owing as much to continental influence as it did to the rest of England; thus the folk-life of its people is a particularly rich vein of investigation for the social archaeologist. In his latest study the author has concentrated upon the twin foci of the old community life—the house and home, and the farm, around which a wealth of history, custom and belief has grown up over centuries.

The construction and detail of thousands of prefabricated timbered and half-timbered houses still testify to the building tradition in an area where there was little native stone. Here were the new status symbols of the merchant and yeoman class as it emerged from the ruins of the medieval system. On them they lavished their affection and ingenuity, and to ward off evil spirits planted shrubs and trees close by and buried a witch-bottle beneath the floor.

Out of the amalgam of pagan and Christian belief a vast 'code' of superstitious practice has governed East Anglian farming, as indeed it has the world over. The bond between farmer and soil, and the anxiety to preserve the greatest possible harmony in that partnership are well described in this book and copiously illustrated.

In an arable economy that depended so much on iron for ploughshares, coulters, horseshoes, etc., the blacksmith was a key figure in the community—a man to whom awe and legend continued to cling long after primitive fear of dealing with the Devil had disappeared. His was a long and arduous apprenticeship following the medieval pattern, and initiation to master status was strictly observed.

Mr. Evans's inquiry into and detailed description of the rituals surrounding the secret horse societies is of outstanding interest, since our knowledge of this dark tradition has hitherto been so meagre.

Like its predecessors, this is an absorbing book and the result of resolute research.

S.R.O'H.

Books Received

Efford Experimental Horticulture Station. Annual Report 1966. Ministry of Agriculture, Fisheries and Food. Copies free from the Director, Efford E.H.S., Lymington, Hampshire.

Luddington Experimental Horticulture Station. Report for 1966. Ministry of Agriculture, Fisheries and Food. Copies free from the Director, Luddington E.H.S., Stratford-on-Avon, Warwickshire.

Trawscoed Experimental Husbandry Farm. Report and Farm Guide 1967. Ministry of Agriculture, Fisheries and Food. Copies free from the Director, Trawscoed E.H.F., Trawscoed, Aberystwyth, Cardiganshire.

A Refrigerated Chitting House. Experimental Farm Buildings. Report No. 10. H. J. M. Messer, G. P. Franghiadi and J. T. R. Sharrock. National Institute of Agricultural Engineering. 4*s.* 6*d.*

Rosewarne Experimental Horticulture Station. 12th Report 1966. Ministry of Agriculture, Fisheries and Food.

The Work of the Chartered Land Surveyor. Copies from the Royal Institution of Chartered Surveyors, 12 Great George Street, Parliament Square, London, S.W.1. 7*s.* 6*d.* (including postage).

Agricultural Advisory Council for England and Wales. Second Progress Report. July 1964-December 1966. Ministry of Agriculture, Fisheries and Food.

Results of Experiments at Experimental Husbandry Farms 1965. No. 13. Part II, Livestock. Ministry of Agriculture, Fisheries and Food.

The Ministry's Publications

Since the list published in the August, 1967, issue of *Agriculture* (p. 378) the following publications have been issued:

FREE ISSUES

ADVISORY LEAFLETS

No. 85. Onion Downy Mildew (Revised)
No. 145. Fowl Pox (Revised)
No. 160. Swift Moth (Revised)
No. 218. Dry Rot of Potatoes (Revised)
No. 433. The Control of Rushes (Revised)
No. 489. Mites in Stored Commodities (Revised)
No. 548. Ergot of Cereals and Grasses (New)

The leaflets listed above are only obtainable from the Ministry (Publications), Tolcarne Drive, Pinner, Middlesex.

ACKNOWLEDGEMENT OF PHOTOGRAPHS

P. 404 Royal Agricultural Society of England. Pp. 406 and 407 R. F. Clements. Pp. 420 and 421 The British Broadcasting Corporation. P. 440 H. G. Clarke. Pp. 444 and 446 National Institute of Agricultural Botany.

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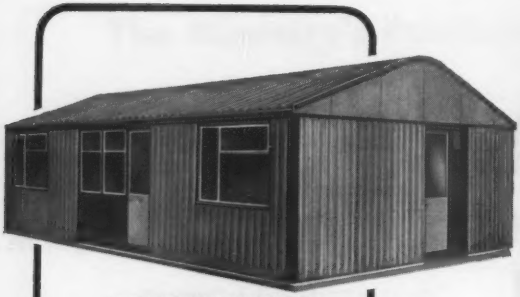

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RC 213/68/02

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RC 213/95/01

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TANZANIA

Agricultural Officers (Animal Husbandry)

RC 213/173/025

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OFFICIAL APPOINTMENTS

TANZANIA—*cont.*

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RC 213/173/023

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Agronomist

RC 213/183/01

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